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AND

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THE

LONDON DISSECTOR,

OR

GUIDE TO ANATOMY;

FOR THE USE OF STUDENTS:

COMPRISING

A DESCRIPTION OF THE MUSCLES, VESSELS, NERVES, LYMPHATICS,
AND VISCERA OF THE HUMAN BODY, AS THEY
APPEAR ON DISSECTION ;

WITH DIRECTIONS FOR THEIR DEMONSTRATION.

FROM THE LAST LONDON EDITION.

REVISED AND CORRECTED BY

EDWARD J. CHAISTY, M. D.,

LATE DEMONSTRATOR OF ANATOMY IN THE UNIVERSITY OF MARYLAND.

PREFACE.

In presenting the LONDON DISSECTOR, under its present form, to the American Student, it may be proper to remark, that I have been prompted by no feelings of vanity; no eagerness for authorship. I felt, even in my own period of study, the difficulty of procuring brief and satisfactory guides for the student of anatomy: I perceived with what reluctance he perused the larger works intended to direct him in his dissection; how rapidly he hurried over the lengthy description of the various parts, and I was led to believe, that a short and sufficiently extensive manual, would be welcomed as a desideratum by the young dissector. Believing, that with a few alterations and additions, the London Dissector might easily be transformed into a work of this description, I have been induced to undertake the task.

It is but just, however, to acknowledge, that for these additions I have been indebted to authors of well known celebrity; that I have drawn freely from Bell's admirable treatise on Anatomy; and Shaw's excellent work on Dissection; and that should the present volume be still received as a work of merit, the praise must redound to the original author of the work, not to the compiler.   His labor will be amply compensated, if it but facilitate the progress of the student, in the acquisition of anatomical knowledge.

CONTENTS.

PART I.—THE MUSCULAR SYSTEM.

COMPENDIUM

OF

PRACTICAL ANATOMY.

GENERAL RULES FOR DISSECTION.

DEXTERITY in the manual operation of dissection can be acquired only by practice; the observance, however, of certain general rules will facilitate the labor of the student.

1. The position of the hand in dissecting should be the same as in writing or drawing; and the knife, held, like the pen or pencil, by the thumb and the first two fingers, should be moved by means of them only; the hand resting firmly on the two other fingers bent inwards, as in writing, and on the wrist. The instrument can thus be guided with much more steadiness and precision, than when moved by means of the wrist, elbow, or shoulder.

2. No more of the integuments should at any time be removed, than is necessary for the present dissection, as exposure to the air renders the parts dry and indistinct.

3. In dissecting muscular parts, the muscles should be extended; the cellular membrane which connects them to the integuments should be placed on the stretch, and entirely removed with the skin; the knife should be kept close to the muscles, and carried steadily in the direction of their fibres, separating a fasciculus at each stroke:—thus the exposed surface will appear clean, and the course of the fibres distinct,

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4. When small vessels are are to be demonstrated, another method is to be followed; the skin only must be removed, and the cellular membrane cautiously dissected from the vessels.

5. During dissection, every little operation should be practised, which can give the dexterity of hand so essential to the surgeon: such as the use of the catheter and probang, the introduction of a probe through the nose into the Eustachian tube, or nasal duct, and the cutting down to the various arteries which may become the object of surgical operations: as the external iliac, femoral, anterior and posterior tibial, brachial, radial, and ulnar, &c.

The grand object of the surgical student is to acquire a knowledge of the relative situation of parts. This should be kept in view in all his anatomical labors. Hence, when he is dissecting the muscles, he should carefully expose the chief blood-vessels and nerves, and attentively consider their position with regard to each other, and to the surrounding parts. The smaller arteries and veins, and the minute nervous ramifications, will be more advantageously studied on subjects devoted to those purposes, and prepared by means of injection, immersion in spirits of wine, &c.

The reader will observe, that, in general, the muscles of one side of the body only are described, because all the muscles of the body have correspondent ones on the opposite side, with a few exceptions, which are pointed out.

The Bursæ Mucosæ met with in the dissection of the muscles are not regularly enumerated; but it is to be understood, that wherever tendons are described as rubbing on bones, muscles, or other tendons, a sac is formed by the surrounding cellular membrane, secreting synovia, to lubricate the parts in motion.

CHAPTER I.

DISSECTION OF THE ABDOMEN.

SECTION I.

Muscles of the abdomen, and the parts connected with them in dissection.

To display these muscles which are ten in number, five on each side, an incision should be made through the integuments, from the sternum to the os pubis; this should be crossed by another passing immediately below the umbilicus: dissect off the flaps; and you will expose,

1. THE OBLIQUUS DESCENDENS EXTERNUS.— This muscle is quite superficial, and covers the whole of the anterior part of the abdomen. The muscular part is closely covered by a thin expansion of cellular substance, which should be removed along with the integuments.

Origin: By eight angular fleshy slips, from the lower edges and external surfaces of the eight inferior ribs, at a little distance from their cartilages; the five superior slips unite on the ribs by digitations with the serratus major anticus; and the three inferior are connected with the attachments which the latissimus dorsi has to the ribs. Often there are only seven portions. To gain a complete view of this muscle, the neighboring portions of the pectoralis major, serratus anticus, and latissimus dorsi should be dissected with it.

The muscular fibres proceed obliquely downwards and forwards, and about the middle of the side of the belly terminate abruptly in a thin broad tendon, which is continued in the same direction over all the forepart of the belly. Here it covers the anterior surface of the rectus abdominis; it is very thin at the upper part, where the rectus lies on the cartilages of the ribs, and is often removed by the beginner, unless he is very cautious.

Insertion: Tendinous and fleshy, into two anterior thirds of the outer edge of the spine of the os ilium; tendinous, into the whole length of Poupart's ligament, the os pubis, the ensiform cartilage, and the whole length of the linea alba.

This muscle called also the external oblique, the descending oblique, or the obliquus major, aids in respiration, in flexing the trunk forwards, in raising the pelvis obliquely when the ribs are fixed; in supporting the abdominal viscera, and in the expulsion of the urine, the fæces, and the fœtus.

In the examination of this muscle, the following points should be observed:

The LINEA ALBA, a white line running along the middle of the abdomen, from the cartilago ensiformis to the os pubis; formed by the tendinous fibres of the two obliqui and the transversalis muscles, interlacing with their fellows on the opposite side.

LINEA SEMILUNARIS, a semi-circular white line, running from the os pubis obliquely upwards over the side of the abdomen, at the distance of about four inches from the linea alba; formed by the tendons of the two oblique and transverse muscles uniting at the edge of the rectus, before they separate to form its sheath.

LINEÆ TRANSVERSÆ, three or four white lines, crossing from the linea semilunaris to the linea alba; formed by the tendinous intersections of the recti shining through the strong sheath which covers them:

These are not evident in all subjects in this stage of the dissection.

UMBILICUS, or Navel. This, which before the integuments were removed, was a depression, appears now a prominence; it consists of condensed cellular membrane:—In the fœtus, it was a foramen which gave passage to the two umbilical arteries, the umbilical vein, and the urachus.

ANNULUS ABDOMINALIS, or Ring, an oblique slit or opening just above the angle of the pubis; formed by the tendon of the external oblique, divided into two portions called the *pillars* or *columns* of the ring, one of which (the *superior* or *internal*) is attached to the symphysis, and the other (the *inferior* or *external*) to the angle of the pubis; and allowing a passage to the spermatic cord in the male, and the ligamentum teres of the uterus in the female. This slit is very improperly named a ring, since its figure is triangular, the pubis is the base, the two columns are the two sides of the triangle. The apex has, indeed, a rounded figure in consequence of some transverse fibres, which connect the two columns where they first separate; and it points obliquely upwards and outwards. It belongs to the external oblique alone, there being no such opening, either in the internal oblique, or the transversalis; it is much smaller in the female than in the male.

LIGAMENTUM INGUINALE, seu *Poupartii*, seu *Fallopii*, a strong ligament, stretching from the anterior superior spinous process of the os ilium, to be fixed to the spine of the os pubis. This in truth is merely the lower edge of the tendon of the obliquus externus abdominis, although, in compliance with received notions, I have described it as a separate ligament. It covers the femoral vessels and nerves, and certain muscles, and has lately been often described under the name of the CRURAL ARCH. It is also the same

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part as the posterior column of the abdominal ring.
The student should not be confused by this multitude
of names; he should remember that the *crural arch,*
the *inferior* or *outer column of the abdominal ring,*
Poupart's or the inguinal ligament, are so many names
applied to the inferior border of the tendon of the
external oblique.

The student should now dissect the parts in the
groin, and examine the situation of the great inguinal
vessels.

In removing the skin from the groin, he will not
find a strong regular fascia, as on the outer part of
the thigh, but a confused and irregular aponeurosis
coming off from the abdomen, and going down upon
the thigh; strengthened by the intermixture of con-
densed cellular substance, and very loose above the
great vessels.

Immediately under the skin, and above this apo-
neurosis, you perceive a congeries of lymphatic
glands, and sometimes the lymphatic vessels them-
selves can be distinguished by their semi-transparent
coats, and knotted appearance. Also, immediately
under the skin, you will find the VENA SAPHENA
running from below upwards, at first lying on the
fascia, and then gradually sinking through it to join
the femoral vein, about an inch below Poupart's liga-
ment.

On removing this irregular fascia, we come down
upon the great vessels, which lie deeply imbedded in
cellular substance, and are closely invested and sup-
ported by a firm cellular sheath, or fascia. This
should all be cautiously removed with the scissors,
together with some lymphatic glands imbedded in the
fat. Observe the order in which the parts are situ-
ated under the crural arch:—that the great external
iliac vein lies next to the pubis;—that the external
iliac artery is on the outside of this, in close con-

tact with it;—that the anterior crural nerve is half an inch exterior to the artery, and lies on the iliacus internus;—and that the outer half of the space left under the crural arch is filled by the psoas magnus and iliacus internus muscles. Observe how the crural arch is stretched over the parts just enumerated; how it forms a thin, but firm, sharp, and crescent-shaped edge towards the pubis (constituting the seat of stricture in the femoral hernia, and sometimes called *Gimbernat's ligament;*)—how the artery is placed in relation to the angle of the pubis and spine of the ilium, passing under the middle of the arch.

The dissection of the other abdominal muscles may now be continued.

Dissect off the serrated origin of the external oblique from the ribs, and from the spine of the os ilium, and detach it from the obliquus internus, which lies below it, and which is connected to it by loose cellular substance, and by small vessels. Continue to separate the two muscles, till you find their tendons firmly attached, *i. e.* a little way beyond the linea semilunaris. Separate the tendon from the crural arch to within half an inch of the abdominal ring.

2. OBLIQUUS ASCENDENS INTERNUS.—It is covered anteriorly by the obliquus descendens externus, and posteriorly by the latissimus dorsi. In its action it assists the obliquus externus; bending the trunk, however, in the reverse direction, so that this muscle on one side co-operates with the obliquus externus of the opposite.

Origin: By short tendinous fibres, which soon become fleshy, from the whole length of the spine of the os ilium, and from the fascia lumborum;* also fleshy from the outer half of Poupart's ligament.

* A tendinous fascia common to this and certain muscles of the back, as the serratus posticus inferior.

The fibres run in a radiated direction; the upper fibres ascend towards the sternum; the central pass more transversely across the abdomen; and the inferior descend towards the pubis. The fleshy belly of this muscle extends beyond that of the external oblique, before it terminates in a flat tendon.

Inserted into the cartilages of the six or seven lower ribs,—fleshy into the three inferior, and, by a tendinous expansion, which is extremely thin, resembling cellular membrane, into the four superior, and also into the ensiform cartilage. The sheet of tendon in which the fleshy belly ends, is continued, single and undivided, into the linea semilunaris; there it splits into two parts, one passing in front and the other behind the rectus muscle, and finally unite in the linea alba; but below the umbilicus the whole tendon of the internal oblique passes along with that of the external oblique before the rectus. The inferior edge of the muscle extends in a nearly straight direction over the spermatic chord to be fixed by a tendinous attachment to the angle of the pubis.

It is sometimes called the obliquus internus abdominis;—the obliquus ascendens;—or obliquus minor.

About the middle of Poupart's ligament, a delicate fasciculus of fibres is sent off from this muscle over the spermatic cord, as it passes under its edge in its way to the ring. This is named the

CREMASTER, and is continued down on the cord, till it is insensibly lost on the tunica vaginalis testis; it will be seen in the dissection of the scrotum: Its *use* is to suspend, draw up, and compress the testicle.

We must now dissect the attachments of the internal oblique, continuing our dissection from behind forwards, and separate it from the transversalis abdominis, which lies beneath it. This separation may be continued till the tendons of the two muscles become inseparable. As this muscle lies closely

upon the transversalis, caution is required to avoid detaching both muscles together.

3. TRANSVERSALIS ABDOMINIS lies beneath the last muscle, and reposes upon the peritoneum.— *Arises*, tendinous, from the fascia lumborum, and back part of the spine of the os ilium; fleshy from all the remaining part of the spine of the ilium, and from the inner surface of Poupart's ligament; and fleshy from the inner surface of the cartilages of the seven lower ribs, where its fibres meet those of the diaphragm.

The fleshy fibres proceed transversely, and end in a flat sheet of tendon, which passes with the posterior layer of the internal oblique behind the rectus, and is *inserted* into the ensiform cartilage, and into the whole length of the linea alba; midway, however, between the umbilicus and os pubis, a slit or fissure is formed in this tendon, through which the rectus abdominis passes; and the remainder of the tendon passes before the rectus, to be inserted into the lower part of the linea alba, and the os pubis.

Where the transversalis is detached from its origins, and turned back towards the linea semilunaris, the peritoneum is laid bare, except in the neighborhood of the crural arch, where it is covered by a thin fascia arising from Poupart's ligament, and continued upwards between the peritoneum and transversalis muscle, until it is gradually lost. This is named by Mr. Cooper, its discoverer, the *fascia transversalis;* it prevents the bowels from being protruded under the inferior margins of the obliquus internus and transversalis muscles. It is perforated about the middle between the ilium and pubes, by an opening for the passage of the spermatic chord, which then goes obliquely downwards, inwards, and forwards to the ring of the external oblique. Thus the abdominal ring is a canal, having an upper or internal opening,

formed in the fascia transversalis, and a lower or external one in the tendon of the obliquus externus.

The next muscle to be described is the

4. RECTUS ABDOMINIS.—*Arises*, by a flat tendon, from the forepart of the os pubis; as it ascends, its fleshy belly becomes broader and thinner.

Inserted, by a thin fleshy expansion, into the ensiform cartilage, and the cartilages of the three inferior true ribs.

Situation: This pair of muscles is situated on each side of the linea alba, enclosed in a sheath formed by the tendons of the oblique and transversalis muscles. Thus the rectus has in front of it the whole tendon of the external oblique, and half of the internal; and behind it, the remaining half of the tendon of the internal oblique and the entire tendon of the transversalis. The muscle is generally divided by three tendinous intersections; the first at the umbilicus, the second where it runs over the cartilage of the seventh rib, and the third between these; and there is commonly a half intersection below the umbilicus. These intersections constitute the LINEÆ TRANSVERSÆ.

At the os pubis, on each side of the linea alba, and inclosed in the lower part of the sheath of the rectus, is sometimes found a small muscle, named

5. PYRAMIDALIS.—*Origin:* Tendinous and fleshy, of the breadth of an inch from the os pubis, anterior to the origin of the rectus.

Insertion: By an acute termination, near half-way between the os pubis and umbilicus, into the linea alba and inner edge of the rectus muscle.

SECTION II.

*Anatomy of Hernia.**

It is of considerable importance in this dissection to have a good body. That of a strong muscular man is not so well adapted for the display of the anatomy of the groin, as that of a person who has died of a lingering disease. The body of a male is the best for the dissection of the inguinal canal, and that of a female for the parts connected with femoral hernia. The subject is to be so placed that the abdominal muscles may be made tense: this is most conveniently done by placing a block of wood under the loins. To put the fasciæ of the thigh upon the stretch, one leg ought to hang over the side of the table. The dissection of the upper part of the external oblique is to be made according to the general rule of removing all the cellular membrane from the muscular fibre; but this plan must not be followed lower down than to a line drawn from the one anterior superior spinous process of the ilium to the other; here, the skin only should be raised; it may be carried down to three fingers' breadth below the line of Poupart's ligament.† By this method we shall leave upon the groin a quantity of condensed cellular membrane, between the layers of which is the arteria epigastrica superficialis; this membrane may be traced from that which covers the pectoralis muscle and the upper part of the muscles of the abdomen; it has generally received the name of fascia superficialis communis, because it is of equal importance to the

* Shaw's Manual.
† Tendon of the external oblique; Fallopian or Poupart's ligament; crural arch; ligament of the thigh; femoral ligament.

inguinal and femoral hernia. This fascia* is now to be dissected from the tendon of the external oblique. It has a very slight attachment to the expanded tendon, and the union between it and the spermatic cord is so slight, that the handle of the knife can be pushed between them as far down as to the bottom of the scrotum. The attachment between the iliac† portion of Poupart's ligament and this fascia is very strong; but the connection between the pubic portion of the ligament and the fascia is so slight, that the handle of the knife is sufficient to destroy it. We can separate the fascia with great ease for about an inch below the edge of this part of the ligament, but we cannot lift it farther without using the knife; for the fascia becomes intimately united to the inguinal glands and to the fascia lata. Although we have raised this fascia, the accurately defined pillars of the abdominal ring, which are generally represented in plates as the first stage of the dissection, will not yet be visible; but farther dissection will be required, to show them; for a fascia, which shall be presently described, covers the ring, so that only a prominence is seen, and which we shall find to be formed by the spermatic cord.

It is of great importance to make this dissection in the manner that has been pointed out, because much of the pathology of femoral hernia may be explained by it. By looking narrowly into the depression which has been formed by raising the fascia superficialis, we may see lymphatic vessels passing across from the glands to perforate a membrane, which,

* Fascia superficialis of Mr. Cooper; described by Camper and many others as only a membranous layer; by Scarpa, as a prolongation of the fascia lata. In the scrotum of the fœtus it forms the external lamina of the peritoneum of Langenbeck.

† The terms *iliac* and *pubic* are better than *external* and *internal*. The length of the Poupart ligament may be divided into three portions: two of the thirds are called *iliac*, the other *pubic*, being that which is nearest to the pubes.

though it appears to be a continuation of the lower
edge of Poupart's ligament, has been, by some, de-
scribed as a distinct fascia, under the name of *cribri-
form*, in consequence of the appearance which it pre-
sents when the lymphatics are cut short. Occasionally
a small gland is projected through the membrane.
The general course of the femoral hernia is either to
displace this gland, or to break through the meshes of
the net-work; and then it will pass into the hollow
which we have just described. The natural course of
the hernia would be, to descend upon the thigh; but
it is prevented from passing farther down, than about
an inch, on account of the close connection which
exists between the fascia superficialis and the glands
of the groin; but when the hernia increases in size,
as it is prevented from descending upon the thigh, it
turns up and breaks through the slight connection
which there is between the pubic part of the liga-
ment and the fascia superficialis, and thus takes the
place of an inguinal hernia. This explains to us that
the acute angle made in the gut is the principal cause
of stricture in femoral hernia; and from the knowledge
of this, we deduce principles upon which we must
proceed to attempt the reduction of femoral hernia,
when so situated. We must endeavour to bring the
base of the sac to a straight line with the neck; and
to succeed in doing this, we must first push the tumor
downwards.

It has occasionally happened that a femoral hernia
has passed up before the surgeon had finished the
operation. We have heard the surgeon blamed for
operating in such a case. It has been said, that the
gut going up before the stricture was cut, proved that
there was no necessity for the operation; but instead
of joining in the censure, we think that it would be
even advisable, in some cases, to cut through the
fascia superficialis, so as to allow the sac to come to

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a straight line, rather than to persevere long in the use of the taxis. All who have seen many cases of femoral hernia must allow, that a cut through the skin and fascia, in an early stage, in many cases, would not be so dangerous as a protracted attempt to reduce the gut by the taxis. We have further to consider, that if it be not possible to reduce a hernia, after having cut through the fascia superficialis, that it never would have been reduced by the taxis; in that case all the steps of the operation must be performed.

We now return to the anatomy of the inguinal hernia. If we pull the spermatic cord towards the scrotum, we shall see a thin fascia passing off from the tendon of the external oblique and attached to the cord. It has been called fascia propria. It is very strong in cases of old hernia; but even in the natural state of the parts, it is so distinct that it obscures the margins of the ring. (a) By cutting this thin fascia where it is connected with the cord, and by letting go the cord, the upper part of the pillars of the ring will be distinctly shown; but to make the opening of the ring quite apparent, we must remove the loose fat with the forceps and scissors from the lower part of the cord; we shall then have such a view as is given in plates as the first stage of the dissection. This opening has been called a *ring*,* but it might with more reason be described as a *triangle*, the *base* of which is the os pubis, and the *apex* the splitting of the

(a) While the fascia superficialis was overlooked; Camper described a covering to the cremaster muscle, extended from the edges of the external abdominal ring. This, however, has since been traced in continuation with the fascia superficialis; is a part of that fascia; and covers the cremaster as the extended aponeurosis does the other superficial muscles of the body. I would rather retain the name of Camper's fascia, to this slip of the superficial fascia; then call it fascia propria; lest it might be confounded with the fascia propria of a femoral hernia, that is derived from the cribriform portion of the crural sheath.

* Inguinal ring; ring of the external oblique; or external abdominal ring. The anatomy of the canal is most accurately described in the folio edition of Mr. Charles Bell's Dissections, published in 1799.

tendinous fibres of the external oblique, and which is rounded off by a set of cross fibres. The superior side, or *pillar*, is simply inserted into the symphysis pubis; but in the attachment and form of the lower pillar there is a provision to prevent the compression of the spermatic cord during the contraction of the muscles, and it is thus—the inferior pillar is formed by the pubic extremity of Poupart's ligament, which is not a rounded tendon that, viewing it on the outside, we should expect it to be, but it is so formed, that part of it passes onwards to be attached to the linea ileopectinea by a flat broad horizontal tendon, while its more external part is inserted into the tubercle of the pubes; so that by this form of insertion there is a groove made for the lodgment of the spermatic cord.

The tendon of the external oblique is now to be cut through in two directions; one in a line drawn from the superior anterior spinous process of the ilium to the linea alba, and the other in the linea alba to the pubes. The tendon of the external oblique is to be carefully separated from the internal oblique, and is to be fastened by a hook to the fore part of the thigh. This will give us a view of a great part of the inguinal canal. The cord will be seen lying under the lower margin of the internal oblique, and so connected by cellular membrane to the edge of the muscle, that it is difficult for a student in his first dissection to tell what is muscle and what is cord. This is in a great measure owing to the cremaster muscle, for it certainly varies considerably in the manner in which it takes its origin; the view may be made more distinct by pulling the cord in a direction towards the scrotum, and taking off the cellular membrane from it and from the margin of the internal oblique. By doing so, we shall see that the internal oblique is not attached to the whole extent of Poupart's ligament, but

that, at two inches and a half from the symphysis pubis,
its attachment to the ligament ceases; it then passes
in the form of an arch, to the tubercle,* and to the
linea ileo-pectinea† of the os pubis, so as to assist in
closing the space behind the external ring.   At the
termination of the connection of the internal oblique
to Poupart's ligament, the fibres which form the cre-
master muscle come off; but as these fibres occasion-
ally arise from Poupart's ligament, the cord some-
times appears to perforate the internal oblique:‡ but
in the greater number of cases, it is sufficiently clear
that the cord passes under the internal oblique, not
through it.   In this part of the dissection we may
observe a nerve running through the internal oblique to
pass on the cord,—it is the spermaticus superficialis.
The next stage of the dissection is to show the rela-
tion of the transversalis to the cord.   It will be very
difficult to raise the internal oblique from the trans-
versalis, if we commence the separation at the lower
edge of the muscle; but by cutting through those
fibres of the internal oblique, which are connected
with the superior anterior spinous process of the ilium,
we shall find some cellular membrane, and a branch
of the artery called circumflexa ilii, lying upon the
transversalis muscle, which will mark the line in
which we are to dissect, so as to raise the internal

* Spine of the os pubis; tuberculum spinosum; tuberosity of the pubes.
† Linea ileo-pectinea; linea innominata, continuous with the crista.
‡ M. Cloquet describes the cremaster as formed by some fibres of the
obliquus internus, which are pulled down by the testicle and guberna-
culum, during the descent.   He says that these fibres have two distinct
attachments, one to the belly of the obliquus internus, and the other to
the os pubis; so that each fibre forms a loop (*des anses*,) similar to
extensible cords, which, when fixed at their two extremities, are
drawn down in the middle.   He also says that the testicle occasionally
passes through the substance of the internal oblique, and then, the same
appearance of fibres is found both before and behind the testicle; and
that an inguinal hernia in a female frequently pushes down some of the
fibres of the internal oblique before it, so as to form "*un muscle cremas-
ter accidentel.*"

oblique from the transversalis. The internal oblique
is to be separated from the transversalis, and from its
connection with Poupart's ligament, as far as the
origin of the cremaster, and it is then to be turned
over towards the linea alba. The whole of the mar-
gin of the transversalis will now be seen, and we may
observe that its relation to the cord is very nearly the
same as that of the internal oblique; indeed, the
tendons of the two muscles are so closely connected
with each other, that it is almost impossible to sepa-
rate them. It will be also apparent that the united
tendons of these muscles, by their insertion into the
linea ileo-pectinea, form the grand protection against
hernia taking place through the external abdominal
ring; but when this part is weak, in consequence of
the deficiency of the tendons, that hernia which is
called *direct*, or *ventro inguinal*, may take place.
The muscular fibres of the transversalis are now to
be very carefully detached from Poupart's ligament,
and then they are to be scraped, not cut, from the
layer of condensed cellular membrane, which is called
the fascia transversalis.*

We have seen the cord pass through the external
oblique, and under the margins of the internal oblique
and transversalis,—and we should now see the inter-
nal ring, described by Mr. Cooper; but this ring must
be *made*. When we pull the cord towards the groin,
we see part of the cellular membrane which lies under
the transversalis muscle passing down upon it in a
conical form. If we cut this membrane from the
cord, and push it up, and then let the cord go, there
will be a hole, formed in the shape of a ring, but
which, on its iliac side only, has a distinct margin, for
on its pubic side there is only the cellular membrane

* Fascia transversalis, of Mr. Cooper; fascia longitudinalis, or reflexa,
of M. Cloquet; condensed cellular membrane between the peritoneum
and transversalis muscle, of many authors.

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surrounding the epigastric artery and veins. We
may observe also, that the cord at this point has lost
its rounded form—that the vessels are not bound
together, as they are at the external ring, but that the
component parts, separating from each other, give
the cord a flattened form. Having now made an
internal ring,(a) we should attend to the situation of
the epigastric artery. It generally arises from the
pubic side of the external iliac artery, just before it
passes under Poupart's ligament. It will be found to
descend a little, and then to proceed upwards towards
the rectus, passing upon the pubic edge of the sper-
matic cord, and between the fascia transversalis and
the peritoneum; it then enters the substance of the
rectus, about midway between the pubes and umbili-
cus. As this artery is always on the pubic side of
the spermatic cord, it follows, that when the inguinal
hernia passes along the spermatic passage, (which it
does in nine out of ten cases,) the epigastric artery
will be on the pubic side of the hernia; but in the
direct or ventro inguinal hernia, the artery will be on
the iliac side.

Let us now trace the course of a common hernia to
the scrotum, and show what coverings it may have,
and what are the probable causes of stricture.

The muscles and the peritoneum may be cut
through in the usual way of exposing the viscera, and
the flap held out so that the inside of the peritoneum,
and the depression which is found at the part where
the cord passes into the canal, may be seen. In the
greater proportion of cases, it is at this point that
hernia takes place. Having laid down the transver-
salis and internal oblique again in their natural situa-

(a) This opening is not the creature of the knife, but exists before
dissection has commenced, as perfectly as that on the upper part of the
cone of a funnel, by which the pipe is connected with the body of the
article.

tions, if we push the finger from within downwards
into the depression of the peritoneum, we shall
exhibit in appearance the first stage of the descent of
a hernia. The finger is as the sac would be, above
the cord, and on the iliac side of the epigastric
artery: by pressing forward the finger, and through
the peritoneum, it will appear under the margins of
the transversalis and internal oblique; and if pushed
farther, it will pass through the external ring. A
hernia lying at this point, would be called inguinal
hernia; but if it were to descend as far as into the
scrotum, it would be called scrotal hernia. This is
the common course of an inguinal hernia, but its rela-
tion to the cord occasionally varies. When we look
to the flattened and dispersed state of the cord at its
upper part, we can understand how it may be split by
the descent of a herniary tumor. In such a case, the
vas deferens is sometimes found on the anterior part,
and the vessels behind; but the vessels are more
frequently on the fore part of the sac.

We may now show what coverings the sac of a
hernia would receive in its passage to the scrotum.

In the common inguinal hernia, the peritoneum
pushes before it, that cellular membrane which has
been called part of the transversalis fascia, and which
we showed must be separated from the cord before
the internal ring can be made; this, when condensed,
forms the innermost covering of the sac. The hernia
then passes under the transversalis and internal
oblique, and as the cremaster muscle runs from the
internal oblique to the cord, it follows, that if the
hernia lies above the cord, the sac must be between
the cremaster and the cord; the fibres of the cremas-
ter which lie above the sac will then be separated, by
it, from each other, so that the cellular membrane
which connects the scattered fibres, will form that
which is called the cremastic or spermatic fascia.

The hernia then passes through the external ring.   In the early part of the dissection, there was a membrane shown passing from the margins of the ring to the cord, so as to make the ring indistinct; this membrane, which is sometimes called fascia propria, must also form one of the coverings.   The hernia may now either lie in the groin, or pass into the scrotum, and in either case it will be covered by the condensed cellular membrane, called fascia superficialis.

If a patient had worn a truss for some time, all these fasciæ might be distinctly seen in an operation; but it is of more importance to recollect, that the peritoneum, which forms the sac, and which, in its natural state, is very thin, would be found very much thickened, and particularly at the neck of the sac; indeed it is occasionally so much thickened, that it may be separated into a dozen layers.   But if it were necessary to perform an operation for a hernia which had come down only a few hours before,—after having cut through the skin and fat, instead of finding distinct fasciæ, such as have been described, only a little cellular membrane would be seen covering the sac, and the sac itself would be so thin and transparent, that the color of the gut may be seen shining through it.

The anatomy of the fasciæ in congenital hernia is much the same; but the sac which is formed by the tunica vaginalis, is generally thin at the lower part, but very strong at the neck.

Before describing what are the probable causes of stricture, there are some circumstances to be recollected.   To produce strangulation, the gut must be compressed in the whole circle; strangulation cannot be produced by the muscular fibres which stretch over the gut, for they relax occasionally; as, for example, when a patient faints.   The hole through which the gut is pushed is passive; its diameter is

never diminished, but the protruded gut swells, and is increased in size.

The most common seat of stricture in inguinal hernia is the external ring; for though we do not see the ring until we have dissected the parts, still we can feel it, even before the skin is removed, by pushing the finger up along the cord. If the sac has been opened, if the external ring has been cut, and the stricture still continues, what is the cause of stricture? It cannot be produced by the margins of the internal oblique or transversalis muscles, for they will relax. Since we are told by high authority, that the stricture, in such a case, is caused by the internal ring, we cannot deny that it may occasionally happen; but we should be more inclined to say, that the stricture is not caused by the internal ring itself, but by the neck of the sac, which is situated at that part. Our reasons for supposing so, are the following:—In the dissection of the parts, in their natural or ruptured state, there is no internal ring, until it is made by pushing up the cellular membrane which surrounds the cord; and even then, if we try its strength, we find it very weak, and particularly on the inner part; while the neck of the sac is generally so strong, that we might as easily break a circle of whip cord as tear it. The external ring, and the neck of the sac, may be considered as the most common seats of stricture; but there are varieties, into the consideration of which it would be impossible to enter at present.

There is a species of inguinal hernia called the *direct* or *ventro inguinal*, which has been already mentioned as having the epigastric artery on its *pubic* side; (*a*) in several other respects it differs from the common inguinal hernia. It does not come along the inguinal canal, but passes directly through the exter-

(*a*) Certainly the iliac side!

nal ring; it is not covered by the cremaster or any part of the fascia transversalis, but only by the fascia propria and superficialis.(*a*) The peritoneum is as liable to be thickened in this species as in the other. We have seen in operation the sac a quarter of an inch in thickness. This kind of hernia does not take place often, but, in proportion to our limited opportunities, it has occurred to us more frequently than it appears to have done to Mr. Cooper.

The dissection of the parts connected with femoral hernia may now be made. We have already described the first steps of the dissection. It is absolutely necessary that the limbs be kept forcibly separated from each other, and that the handle of the knife only, should be used in removing the glands, as we are very apt to destroy some of the connections of the fasciæ, if we use a sharp knife while the limbs are lying straight. When the glands are removed, we may see the manner in which the fascia lata is connected to the Poupart ligament; how it dips down towards the femoral vessels, and how it mounts up again to cover the pectinalis muscle. The part of the fascia lata which dips down towards the femoral vessels, will have a crescentic form; but this will not be so distinct as is represented in many plates, particularly in those of Mr. Hey, unless we cut through the connection which there is between the fascia lata and the sheath of the vessels; but by doing so, we would destroy the natural view. This part generally receives the name of *superficial* crescentic arch;* for

(*a*) By this expression, the student would be led to expect that a scrotal hernia had two coverings from fasciæ above the cremaster; while Camper's fascia is the only one lying between that muscle and the common integuments.

* Femoral ligament, of Mr. Hey; falciform process of the fascia lata, of Mr. Allan Burns. All these parts are accurately described in the folio edition of Mr. Charles Bell's Dissections, published in 1799. He did not give them names.

we shall afterwards see a *deep* one. It is in this stage of the dissection that we can understand how some surgeons have described the femoral hernia as situated under the fascia lata, while others have described it as lying above the same fascia; in truth, the femoral hernia is above one portion of the fascia lata, and below another, for it is under this part which is called crescentic arch, and above the portion which covers the pectineal muscle.

If we pull away the lymphatics which are passing from the inguinal glands to those of the pelvis, we shall see a number of holes in a membrane which connects the lower edge of the Poupart ligament to the pectineal portion of the fascia lata: this part we have already noticed. Though it will not appear as a distinct fascia in our dissection, still it has received the name of fascia cribriformis from Mr. Cooper; and as an addition to our stock of names, we have, from M. Cloquet, septum crurale. It must be very carefully examined, for it is the only weak part of the boundary between the pelvis and the thigh; for, on the iliac side of this fascia cribriformis, Poupart's ligament is firmly attached to the fascia lata, and on its pubic side there is a firm union between the edge of the third insertion of the Poupart ligament and the portion of fascia lata which covers the pectinalis muscle.*

We now proceed to the examination of the internal view. The flap of the abdominal muscles is to be held up, and the peritoneum is to be carefully torn from it; by which a useful view will be given, without our using the knife at all. At about an inch from the pubes, we see a depression, bounded by the cribriform fascia, through which the lymphatics pass into the

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* While at this stage of the dissection the leg should be moved in different directions, to show the effect of the various positions in relaxing or tightening the fasciæ.

pelvis from the thigh. The part of Poupart's liga-
ment which is on the iliac side of this cavity, is very
firmly connected with the fascia which covers the
iliacus internus muscle; and on its pubic side, the
united tendons of the internal oblique and transversalis
muscles are inserted into the linea ileo-pectinea. If
we push our finger into this depression, and force it
through the cribriform fascia, it will pass down into
that hollow on the fore part of the thigh, which has
been already described as the situation in which a
femoral hernia lies. The firm connection which
there was between the fascia superficialis and the
glands of the groin, would have prevented us from
passing the finger farther down; but if we turn up the
finger as a hernia does, when it increases in size, we
shall find that it not only presses against the superficial
arch, but that there is also a resistance to it, caused
by a part more deeply situated; this will afterwards
be found to have been produced by that which is
called the deep crescentic arch.

To show this deep arch as a distinct fascia, there
is a great deal of dissection required, and it may very
justly be criticised as one of the tricks of the dis-
sector; but as it is a point of anatomy which is often
talked of, we shall describe what appears to us to be
the easiest mode of displaying it. It may be shown
on the same limb in which the anatomy of inguinal
hernia has been seen, but it would be better to have
another, and then we may proceed thus:—after having
made the dissection of the external oblique, and of the
superficial crescentic arch, in the manner already de-
scribed; we should hold up the flap of the external
oblique, and dissect between it and the internal as
far down as the edge of Poupart's ligament. The
ligament is then to be divided into two laminæ, by
forcing the handle of a knife between the point of
union of the external and internal oblique with it; by

pushing the knife towards the thigh, it will pass under
the fascia lata; then by moving it in a horizontal direc-
tion between the pubes and ilium, the external oblique
and fascia lata, which are connected together through
the medium of the superficial part of Poupart's liga-
ment, will be so completely separated from the parts
below, that the ligament will appear to be formed by
them only. But if we cut through the attachment of
the ligament to the superior anterior spinous process
of the ilium, and through the fascia lata as far down
as the crescentic arch, (to save the parts below, it is
useful to keep the handle of the knife under the fascia,
as a directory to cut upon,) we shall then have a
view very similar to that we have just destroyed,
for we shall see that the deep crescentic fascia has
nearly the same form as the superficial arch. This
deep arch may be described as being formed on the
iliac side of the vessels, by a connection between the
fascia iliaca and the obliquus internus and transver-
salis, and part of Poupart's ligament; and on the pubic
side, by the fascia transversalis, in union with the
insertions of the tendons of the two muscles into
the linea ileo-pectinea. But this we shall more fully
comprehend by examining the parts from within. On
looking into the pelvis, we see the artery and vein,
surrounded by a proper sheath, lying upon the iliac
fascia, which is the name given to that which covers
the iliacus internus and psoas magnus. If we hold
up the part of the abdominal muscles which has been
left, and look under them towards the thigh, we shall
see an opening like the mouth of a funnel, into which
the vessels, surrounded by their sheath, pass. The
posterior boundary of this space may be described as
formed by a prolongation from the fascia iliaca, and
from which, for a certain space, the vessels can be
easily separated. The anterior boundary *may* be
traced from the fascia transversalis; being in fact, that

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which is in close connection with the abdominal
muscles, and forms part of that which has been called
the deep crescentic arch.   At a short distance below
Poupart's ligament, the fascia iliaca and transversalis
become so closely connected with each other, and
with the cellular membrane which forms the sheath
of the vessels, that they cannot be traced farther
down upon the thigh.

The space which has just been described as bounded
by the fascia iliaca and fascia transversalis, has re-
ceived various names; by many surgeons it has been
called the crural sheath,* by others, the sheath of the
vessels; and consequently, when the latter describe
femoral hernia, they say that it passes along the sheath
of the vessels; but this language is very incorrect, and
leads to great confusion, for the proper sheath of the
vessels is a distinct part, formed by cellular mem-
brane, which surrounds them through their whole
course from the sacrum to the point where the pro-
funda is given off.

M. Cloquet gives the description of this part too
much in the spirit of a modern discoverer of fasciæ
and rings.   He says that we have here a part analo-
gous to the inguinal canal; that this (the crural canal)
"has a superior and inferior opening.   The inferior
is the opening by which the saphena passes through
the fascia lata to enter the femoral vein."   Although
this opening is represented in all the plates of the
anatomy of the groin, given by our own authors, yet
we have not described it, because we think that it is
not of importance, in considering femoral hernia,—
not on account of its situation, but because the con-
nection which there is between the fascia superficialis
and the lymphatic glands, prevents a femoral hernia

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* There is no crural ring in the natural state of the parts, but it may
be *felt* during an operation; and a distinct ring may be shown in a pre-
paration, by removing the whole of the herniary sac. Such an appear-
ance is very well shown in Mr. Cooper's plates.

from passing so low down. There are no cases given by English authors, of hernia protruding through this hole, but M. Cloquet says, that he and M. Beclard, have seen many examples of it.

SECTION III.

Dissection of the Cavity of the Abdomen.

THE abdomen is divided into three regions, each of which is again sub-divided.

1. The EPIGASTRIC, or upper region, includes the part covered at the side by the ribs; its lateral portions are named the right and left HYPOCHONDRIA, and its central, the scrobiculus cordis.

2. The UMBILICAL, or middle region, is the space immediately under the former; and it extends below to the anterior superior spines of the ilia. Its sides are called the lumbar or iliac regions.

3. The HYPOGASTRIC, or lowest region, is sub-divided into three parts, one middle, termed REGIO PUBIS, and two lateral, named INGUINAL regions.

Before you disturb the viscera, observe the general situation of those parts which appear on first opening the abdomen.

1. The internal surface of the PERITONEUM, smooth, shining, and colorless, covering the parietes of the abdomen, and the surface of all the viscera.

2. In the triangular portion formed by two imaginary lines drawn from the anterior spinous process of the ilium to the umbilicus, three ligamentous cords projecting through the peritoneum, two running laterally, and the other in the middle, towards the navel. These are the remains of the two umbilical arteries and the urachus.

3. The epigastric artery, accompanied by two veins, may be seen through the peritoneum, ascending obliquely upwards and inwards from under Poupart's ligament.

4. The upper edge of the liver is seen extending from the right hypochondriac region, across the epigastric, into the left hypochondriac region; in it a fissure is seen, into which enters, inclosed in a duplicature of peritoneum, the ligamentum teres, which was, in the fœtus, the umbilical vein. The fundus of the gall-bladder, if distended, is sometimes seen projecting from under the edge of the liver.

5. The Stomach will be found lying in the left hypochondriac region, and upper part of the epigastric; but, if distended, it protrudes into the umbilical region.

6. The Great Omentum, or *omentum majus*, proceeds from the great curvature of the stomach, and is spread like an apron over the intestines.

7. The Great Transverse Arch of the Colon will be seen projecting through the omentum; it ascends from the os ilium of the right side, crosses the belly under the edge of the liver, and under the greater curvature of the stomach, and descending again upon the left side, sinks under the small intestines, and rests upon the wing of the left os ilium.

8. The Small Intestines lie convoluted in the lower part of the belly, surrounded by the arch of the colon.

Such is the general appearance on first opening the abdomen; this will vary, however, as one intestine may happen to be more inflated than another, or according to the position of the body after death.

But to consider the parts more minutely:

1. The Peritoneum.—Observe how it is reflected from the parietes of the abdomen over all the viscera, so that they may be said to be situated behind it;

trace its reflections from side to side, and from above downwards; you will see that the external coat of every viscus, and all the connecting ligaments, are reflections or continuations of this membrane.

(1.) The FOUR LIGAMENTS of the LIVER are formed by the peritoneum, continued from the diaphragm and parietes of the abdomen.

a, The MIDDLE or SUSPENSORY LIGAMENT, inclosing in its duplicature the LIGAMENTUM TERES.

b, The CORONARY LIGAMENT, connecting the upper surface of the liver to the diaphragm.

c, The BROAD LIGAMENT of the right side.

d, The BROAD LIGAMENT of the left side.

(2.) The LESSER OMENTUM, or EPIPLOON, or the MESOGASTRION, is formed by two laminæ of peritoneum, passing from the under surface of the liver to the less curvature of the stomach, and containing in its duplicature the vessels of the liver.

(3.) The GREAT EPIPLOON or OMENTUM.—Observe, that the peritoneum, coming from both surfaces of the stomach, and from the spleen, proceeds downwards into the abdomen, and is then reflected back upon itself, till it reaches the transverse arch of the colon, where its laminæ separate to invest that intestine. This reflection is named the Great Omentum; it is a pouch or bag, composed of four laminæ of peritoneum, and the opening into it is by the FORAMEN of WINSLOW: Observe the situation of this semilunar opening; it is on the right side of the abdomen, at the root of the less lobe, or lobulus spigelii of the liver; it leads under the little epiploon, under the posterior surface of the stomach, but above the pancreas and colon, into the sac of the omentum;— the omentum sometimes reaches to the lower part of the hypogastric region, sometimes not beyond the navel; it contains in its duplicature more or less of adipose substance.

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(4.) The MESENTERY.—Observe, that the perito-
neum, reflected from each side of the vertebræ, pro-
ceeds forward, to connect the intestines loosely to the
spine; that it begins opposite to the first lumbar ver-
tebra, crosses obliquely from left to right, and ends
half-way between the last lumbar vertebra and the
groin.   At its commencement, it binds down the
extremity of the duodenum, and terminates where the
head of the colon begins.   The great circumference
which is in contact with the intestines, is very much
plaited or folded, and is several yards in length.
Between the laminæ of mesentery, observe the CON-
GLOBATE GLANDS, less numerous in old age: the
branches of the superior mesenteric artery ramifying
and forming arches; the mesenteric veins accompa-
nying the arteries; the trunk of the lacteals, situated
contiguous to the mesenteric artery on its left side.
It may sometimes be inflated by the blow-pipe.
Nerves also run in the mesentery, but are not easily
demonstrated.

(5.) The MESOCOLON is similar to the mesentery,
and connects, in like manner, the colon to the spine.

2. HEPAR, the LIVER.—*Situation*: Partly in the
right hypochondrium, which it fills up, reaching as
low as the kidney of that side, partly in the epigas-
trium, and running also some way into the left hypo-
chondrium.

Connected by its four ligaments to the inferior sur-
face of the diaphragm, and by the smaller epiploon to
the small curvature of the stomach:—The little
epiploon should now be removed, to discover the
different parts of the liver.

Observe its superior or convex surface adapted to
the arch of the diaphragm; the inferior or concave
surface resting on the stomach;—the posterior or
thick edge lying against the vertebræ, and the anterior
thin margin corresponding to the lower edge of the

chest;—Observe the three lobes of the liver;—the great or right lobe;—the small or left lobe;—the lobulus spigelii;—the great fissure, separating the right and left lobe, and receiving the suspensory ligament, and the ligamentum teres;—the cavity of the portæ between the great lobe and lobulus spigelii;—the fissure on the right side of the lobulus for the vena cava inferior, which fissure is almost a complete foramen; the notch in the back-part for the vertebræ;—the depression in the right lobe for the gall-bladder. Observe the vessels in the cavity of the portæ, the hepatic artery on the left side, the ductus communis choledochus on the right side, and betwixt, but at the same time behind them, the vena portæ; they are all surrounded by a plexus of nerves. These vessels and nerves pass along the edge of the mesogaster, or little omentum, surrounded and connected by adipose and cellular substance; the part is called CAPSULA GLISSONI. Observe that the ligamentum teres was the umbilical vein of the fœtus, entering the vena portæ, and that the ductus venosus in the fœtus (obliterated in the adult,) leaving the vena portæ, passed into one of the venæ cavæ hepaticæ.

3. VESICULA FELLIS, the GALL-BLADDER.—*Situation*: In the right hypochondrium, in a superficial depression on the under surface of the right lobe of the liver; it sends off the DUCTUS CYSTICUS, which, uniting with the DUCTUS HEPATICUS, forms the DUCTUS COMMUNIS CHOLEDOCHUS; this perforates the first curvature of the duodenum.

4. VENTRICULUS, the STOMACH.—*Situation:* In the left hypochondriac and epigastric regions: *Connected* to part of the inferior surface of the diaphragm, to the concave surface of the liver by the little epiploon, to the spleen by a reflection of peritoneum, and to the arch of the colon by the great omentum. Observe its greater curvature looking downwards, its

less curvature looking upwards; and its two lateral surfaces. Observe the bulging extremity on the left side, the cardia or upper orifice, where the œsophagus enters, and the pylorus, or lower orifice, at the end of the small extremity.

5. The INTESTINES.—They are divided into two classes, the small and the large.

The small intestines are again subdivided into the duodenum, jejunum, and ileon; the large into cæcum, colon and rectum.

(1.) SMALL IMTESTINES.—They are about four times as large as the body.

a, The DUODENUM is broader than any other part of the small intestines, but is exceedingly short: leaving the pylorus it passes upwards, under the liver and gall-bladder; and turning upon itself, it descends, as low as the right kidney; in which space it receives the pancreatic and cystic ducts; it then crosses before the renal vessels and the aorta, and being firmly bound down by the peritoneum, upon the last vertebra of the back, it ascends from right to left, till it is lost under the root of the mesocolon.

By turning back the colon and omentum, over the brim of the thorax, and pushing down the small intestines towards the pelvis, you find the duodenum coming out from under the mesocolon, but still tied close to the spine; it terminates in the jejunum, exactly where the mesentery begins.

b, The JEJUNUM constitutes the first or upper half of the remaining small intestines, and is situated more in the upper part of the abdomen; it is redder, and its coats feel thicker to the touch, from the greater number of the valvulæ conniventes on its inner surface; and its diameter exceeds that of the ileon.

c, The lower half is named ILEON; it is situated more in the lower part of the abdomen, and termi-

nates in the great intestine, by entering the caput coli, or beginning of the colon.

The course of the canal, independently of its convolutions, is from the left lumbar region, where the duodenum emerges from under the mesocolon to the right inguinal region, where the ileon terminates in the caput coli.

(2.) The divisions of the great intestines.

d, The CÆCUM, or blind gut, is tied down by the peritoneum to the loins on the right side, lying in the space under the right kidney, and hid by the convolutions of the ileon.   On its posterior part there is a little appendage, of the shape of an earth-worm, named *Appendix Cœci Vermiformis*.

e, The COLON.—Its commencement at the cæcum is termed CAPUT COLI, or head of the colon; it passes from the cæcum over the right kidney, to which it is connected by cellular substance, and having passed under the gall-bladder, which, after death, tinges it with bile, it goes across the upper part of the belly, forms the GREAT TRANSVERSE ARCH.   In its whole course it is contracted into cells by its muscular fibres, which are united together, forming longitudinal bands; and to its surface are attached some fatty projections named Appendices Epiploicæ.   These two circumstances may distinguish the large from the small intestines; more than their difference of size. For when the large intestine is empty, it contracts, and may be even smaller than the small; but if it were inflated, it could be distended to a much greater degree.   The colon then passes backwards under the stomach and spleen into the left hypochondrium; and descending over the left kidney, it is again tied down; finally it turns over the brim of the pelvis, being at this part unconfined, and forming a loose and remarkable curvature, which is named the SIGMOID or ILIAC FLEXURE, terminates in

The RECTUM.—Which descends along the anterior surface of the sacrum and os coccygis to the anus.

By drawing the stomach towards the right side, you will expose,

6. The LIEN, or SPLEEN.—*Situation:* In the left hypochondriac region, between the great extremity of the stomach, and the neighbouring false ribs, under the edge of the diaphragm, and above the left kidney; to all of which it is connected by the peritoneum. It is of an oval figure; slightly convex on its external and irregularly concave on its internal surface, and divided by a longitudinal fissure, into which its vessels enter.

7. The PANCREAS.—This gland was in part seen on removing the little epiploon; it is more fully exposed, by tearing through the great epiploon between the great curvature of the stomach, and the transverse arch of the colon. It lies in the cavity into which the foramen of Winslow leads; it extends from the fissure of the spleen across the spine, under the posterior surface of the stomach, and terminates within the circle formed by the duodenum; it is only covered on its anterior surface by the peritoneum.

The PANCREATIC DUCT pierces the coats of the duodenum, and enters the cavity of that intestine, by an orifice common to it, and to the ductus communis choledochus. The duct runs along the very centre of the gland, where the whiteness of its coats will readily enable the student to distinguish it.

All the abdominal viscera may now be removed, except the rectum, where it descends into the pelvis, which, being tied, should be allowed to remain, for it belongs to the demonstration of those parts: or the liver and its vessels, with the pancreas, may be left; and the vessels entering the portæ of the liver traced.

The peritoneum should now be carefully dissected from the diaphragm, and from the sides and back-part

of the abdomen, that the parts which lie more imme-
diately behind that membrane may be examined.

8. RENES, the KIDNEYS. Two glandular bodies,
situated in the posterior part of the abdominal cavity,
one on each side of the lumbar vertebræ, between the
last false rib and the spine of the ilium, and imbed-
ded in a quantity of adipose membrane.

Each kidney has a concavity turned obliquely for-
wards and inwards; and is convex obliquely back-
wards and outwards; its superior extremity is nearer to
that of the opposite kidney than the inferior. Observe
the renal or emulgent artery entering the concave sur-
face, and the vein and ureter passing out. Notice the
course of the ureter; it passes behind the peritoneum
over the psoas muscle into the pelvis, and running
between the rectum and bladder, penetrates the latter.

9. The CAPSULÆ RENALES.—Are two glandular
bodies situated on the upper extremity of each kid-
ney, their figure is irregular, crescent-like, or some-
what triangular.

By the removal of the peritoneum, several muscles
are exposed, situated at the superior and posterior
parts of the abdomen.

DIAPHRAGMA, the DIAPHRAGM, or MIDRIFF.—
This is a broad, thin, muscular septum between the
thorax and abdomen; it is concave below, and convex
above, the middle of it on each side reaching as high
within the thorax as the fourth rib. It is divided into
two portions:

1. The superior or greater muscle of the dia-
phragm, forms the transverse partition between the
chest and abdomen,

Arising, by distinct fleshy fibres, 1. From the pos-
terior surface of the ensiform cartilage; 2. From the
cartilages of the seventh, and all the false ribs; 3.
From the ligamentum arcuatum, which is a ligament
extending from the top of the twelfth rib to the lum-

bar vertebræ, forming an arch over the psoas and quadratus lumborum muscles. The fibres run, in different directions, like radii from the circumference to the centre of a circle, and are

Inserted into a broad tendon (*tendinous centre*, or *cordiform tendon*,) which is situated in the middle of the diaphragm, and in which, therefore, the fibres from the opposite sides are interlaced.

2. The inferior or less muscle, or appendix of the diaphragm, lies on the bodies of the vertebræ, and

Arises, by four small tendinous feet, on each side, from the second, third, and fourth lumbar vertebræ; these tendons soon join, to form a strong pillar on each side, named the Crus of the Diaphragm. The crura run obliquely upwards and forwards, form too fleshy bellies, a fasciculus of each of which crossing over to the other, decussates with the opposite one, and thus forms the interval of the two crura into a superior and inferior opening.

Inserted into the posterior part of the middle cordiform tendon.

Situation: The diaphragm is perforated in its fleshy and tendinous parts by several blood-vessels, and other important organs.

(1.) The aorta lying close upon the spine passes between the tendinous part of the crura; and the thoracic duct passes betwixt the orta and the right crus.

(2.) A little above, and to the left side of the aorta, the œsophagus, with the eighth pair of nerves attached to it, passes through an oval fissure formed in the fleshy columns of the inferior muscle. These two parts are separated by the decussating fasciculi just described.

(3.) The vena cava perforates the tendon towards the right side by a triangular hole.

(4.) The posterior intercostal nerve, and branches of the vena azygos, perforate some of the posterior

fibres of the crura:—The splanchnic, or anterior intercostal nerve, also passes through an opening in the substance of the crura.

(5.) On each side of the sternum there is a small fissure, where the peritoneum and pleura are only separated by adipose membrane.

Use: The diaphragm is one of the chief agents in respiration; it also acts in coughing, laughing, and speaking, and in the expulsion of the urine and fæces.

The muscles situated within the posterior part of the abdominal cavity are four on each side.

1. THE PSOAS PARVUS.—It *arises*, fleshy, from the sides of the last dorsal, and first lumbar vertebra; it sends off a small long tendon, which, running on the inside of the psoas magnus, is

Inserted, thin and flat, into the brim of the pelvis, at the junction of the os ilium and pubis.

This muscle lies on the anterior part of the loins, betwixt the psoas magnus and the vertebræ; sometimes, however, it is wanting.

2. THE PSOAS MAGNUS.—It is situated between the psoas parvus and iliacus internus. It *arises*, fleshy, from the side of the body, and transverse process of the last vertebra of the back, and in the same manner from all those of the loins, by as many distinct slips. It runs down over the brim of the pelvis, and is

Inserted, tendinous, into the trochanter minor of the os femoris, and fleshy, into that bone immediately below the trochanter.

3. The ILIACUS INTERNUS.—This muscle fills up the internal concave surface of the os ilium. It *arises*, fleshy, from the transverse process of the last lumbar vertebra, from all the inner margin of the spine of the os ileum, from the edge of that bone between its anterior superior spinous process and the acetabulum, and from all its hollow part between the spine and the linea innominata. Its fibres descend under the outer

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half of Poupart's ligament, and join the tendon of the psoas magnus.

Inserted with the psoas magnus into the trochanter minor. This muscle is covered by a pretty strong fascia, which is inserted into the crista of the ilium, and into the crural arch: the FASCIA ILIACA. The latter insertion prevents the bowels from descending under Poupart's ligament, except at the inner edge of the iliac vein, which is accordingly the situation of the crural hernia, and which the student should examine most carefully. A part of this fascia is also continued behind the femoral vessels over the pubis, to form a part of the sheath which incloses those vessels.

4. The QUADRATUS LUMBORUM.—This muscle *arises*, tendinous and fleshy, from rather more than the posterior third of the spine of the os ilium.

Inserted into the transverse processes of all the vertebræ of the loins, the posterior half of the last rib, and, by a small tendon, into the side of the last vertebra of the back.

It is situated laterally at the lower part of the spine, more outwardly than the psoas magnus, between the origin of the psoas and the transversalis abdominis.

CHAPTER II.

DISSECTION OF THE PERINEUM AND OF THE MALE ORGANS OF GENERATION.

THE muscles to be demonstrated being imbedded in loose cellular substance, are to be dissected with great caution. The Rectum having been cleansed, hair may be introduced into its extremity, to keep the anus gently protruding during the dissection; or a cork, with a loop attached to it, may be introduced, and the mouth of the gut tied upon it;—this last method is preferable, as the intestine can then be turned in every direction. To facilitate the dissection introduce a staff into the bladder, to mark out the situation of the urethra; and place the subject in the same position as for the lateral operation of lithotomy.

The muscles of the perineum consist of five pair, and a single muscle:

ERECTOR PENIS,
ACCELERATOR URINÆ,
TRANSVERSUS PERINÆI, } on each side. { SPHINCTER ANI, single muscle.
LEVATOR ANI,
COCCYGEUS.

In commencing this important dissection, recollect that the erector muscle, covering the crus of the penis, arises from the tuber ischii, and ascends on the inside of the ramus of that bone,—that the transversus perinei arises from nearly the same point, and crosses the perineum, lying often at a considerable depth in the adipose substance. The tuber ischii then be-comes a proper place for the commencement of the

dissection; carefully tracing the muscles arising from
that point, remove all the cellular substance, situated
in the perineum, while the muscular fibres are left
untouched; the RAPHE or line running along the skin
of the perineum, marks the place where the opposite
muscles meet. The appearance of these muscles
will vary in different subjects. In the weak and
emaciated, the fibres will be pale, and not very evi-
dent, while in strong muscular men, who have expired
suddenly, they will be very distinct. This dissection
is to be continued till all the parts between the tube-
rosities of the ischia on each side, and between the
pubis before, and the tip of the os coccygis behind,
are fairly brought into view. Observe

The ERECTOR PENIS covering the crus of the
penis.

The ACCELERATOR URINÆ embracing the bulb
and lower part of the CORPUS SPONGIOSUM of the
urethra.

The SPHINCTER ANI, encircling the anus.

The TRANSVERSUS PERINÆI, crossing the perineum
transversely.

1. The ERECTOR PENIS—*Arises*, tendinous and
fleshy, from the tuberosity of the os ischium; its
fleshy fibres proceed upwards over the crus of the
penis, adhering to the outer and inner edges of the
ascending ramus of the os ischium, and of the de-
scending ramus of the os pubis;—but before the two
crura meet to form the body of the penis, it ends in
a flat tendon, which is lost in the strong tendinous
membrane that covers the corpus cavernosum.

2. THE ACCELERATOR URINÆ—*Arises*, by a thin
tendinous expansion, from the descending ramus of
the pubis, and from the ascending ramus of the
ischium, nearly as far down as the tuber; the
fleshy fibres are seen coming out from the angle
between the crus and the corpus spongiosum urethræ;

they proceed obliquely downwards and backwards, embrace the bulb and lower part of the corpus spongiosum, and are

Inserted into a white tendinous line in the middle of the bulb of the urethra, joining there with the muscle of the opposite side. The lowermost fibres run nearly transversely, while the superior fibres are very oblique.

This muscle, called also, ejaculator seminis, forces the urine and semen forwards, by compressing the lower part of the urethra, and propels the blood towards the corpus spongiosum and the glans penis.

3. The TRANSVERSUS PERINÆI—*Arises* from the tough fatty membrane that covers the tuber ischii, immediately behind the attachment of the erector penis; thence its fibres run transversely inwards.

Inserted into the central point of union where the sphincter ani touches the accelerator urinæ, and where a kind of tendinous projection is formed, common to the five muscles.

Use: This muscle, or the transversalis penis serves to dilate the bulb of the urethra, to prevent the anus from being too much protruded, and to retract it when protruded.

There is sometimes another slip of fibres, the TRANSVERSUS PERINÆI ALTER, which has the same course, and is inserted into the posterior part of the bulb of the urethra.

4. The SPHINCTER ANI is a broad circular band of fibres which surround the extremity of the rectum, passing nearly as far out as the tuber ischii; the fibres of each side decussate where they meet.

It arises from the extremity of the os coccygis behind;* and is inserted before into a tendinous point

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*The sphincter ani often arises by an elastic tendon, approaching to the nature of a ligament, from the apex of the os coccygis. This tendon is of some length; it gives off muscular fibres, which surround the extremity of the rectum.

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common to this muscle, and to the acceleratores urinæ and transversi perinei. This tendinous point is worthy of remark; it seems to consist in part of an elastic ligamentous substance.

It closes the anus, or extremity of the rectum, and draws down the bulb of the urethra. It is in a state of constant contraction, independently of the will, in order to prevent the contents of the rectum from escaping except at those times when we make an effort to evacuate them.

More deeply seated than the muscles now described, we see some of the fibres of

The LEVATOR ANI.—This muscle, called also *Musculus ani Latus*, arises from the inside of the os pubis, at the upper edge of the foramen thyroideum, from the inside of the os ischium, from the tendinous membrane covering the obturator internus and coccygeus muscles;—from this semicircular origin its fibres run down like radii towards a centre, and are

Inserted into the two last bones of the os coccygis, and the verge of the anus, passing within the fibres of the sphincter ani, but on the outside of the longitudinal fibres of the gut itself.

This muscle, with its fellow, very much resembles a funnel, surrounding the extremity of the rectum, the neck of the bladder, (which passes through a slit in its fibres,) the prostrate gland, and part of the vesiculæ seminales.

It serves to draw the rectum upwards after the evacuation of the fæces, to assist in closing it, and to compress the vesciculæ seminales, and other viscera of the pelvis.

6. The COCCYGEUS *arises*, tendinous and fleshy, from the spinous process of the os ischium, and covers the inside of the posterior sacro-sciatic ligament; it forms a thin fleshy belly.

Inserted into the extremity of the os sacrum, and the lateral surface of the coccygis, immediately before the gluteus maximus, and between it and the levator ani.

It supports and moves the os coccygis forwards, and connects it more firmly with the sacrum.

The acceleratores urinæ and transversi perinei must now be removed from their insertions. They may be left suspended by their attachments to the bone. The rectum must be separated from the bladder, and pulled downwards. This dissection will expose a great part of the levator ani;—the neck and body of the bladder;—the prostrate gland;—the vesiculæ seminales;—the glandulæ anteprostatæ;—part of the vasa deferentia; part of the ureters;—the urethra, its membranous part, its bulb, and corpus spongiosum;—the crura penis, and their origins from the ischium;—Observe,

1. The connection of the bladder and rectum, and the cellular substance interposed between them.

2. The prostate gland: *Situated* between the bladder and rectum, surrounding the beginning of the urethra in such a manner, that one third of its thickness is situated above the urethra, and two-thirds below it; its shape is somewhat pyriform, and its consistence between cartilage and ligament.

3. The URETHRA.—The curve should be carefully observed. The urethra begins at the neck of the bladder; it is a continuation of that part of the bladder which in the erect posture is lowest. (1.) Its beginning is imbedded in the prostate gland. (2.) Its membranous part is very short,—situated between the prostate gland and bulb of the urethra:—in dissecting, remark, that there is a firm fasciculus of fibres surrounding it, and connecting it and the prostate gland to the arch of the pubis; this fasciculus gives support to the urethra, and is termed the liga-

mentum triangulare urethræ. It is sometimes described as a compressor muscle of the prostate gland. (3.) The urethra then enters the corpus spongiosum.

4. The CORPUS SPONGIOSUM URETHRÆ consists of a plexus of minute veins covered externally by a thin but uniform tendinous sheath; it surrounds the urethra from a short distance from the bladder to its extremity: at its beginning, it forms a considerable body of a pyriform shape, termed the *Bulb of the Urethra;* that part of the bulb which is below the urethra, is named the pendulus part of the bulb. The corpus spongiosum is expanded at its anterior extremity, to form the glans penis.

5. The GLANDULÆ ANTEPROSTATÆ, or Cowper's Glands, are two small glands of the size of peas, situated immediately before the prostate, and between the membranous part and bulb of the urethra.

6. The VESICULÆ SEMINALES are two soft, whitish, knotted bodies, about three or four fingers-breadth in length, and one in breadth, and about three times as broad as thick: *Situated* between the rectum and lower part of the bladder obliquely, so that their inferior extremities are contiguous, and are affixed to the base of the prostate gland, while their superior extremities are at a distance from each other extending outwards and upwards, and terminating just on the inside of the insertion of the ureters in the bladder.

7. The two VASA DEFERENTIA are seen running betwixt the vesiculæ seminales, and united to them and to the base of the prostate. Observe that part of the bladder, left between these tubes, and connected by cellular substance to the rectum, which is pierced when the bladder is punctured from the latter part.

8. The CORPORA CAVERNOSA PENIS arise, on each side, by a process named the CRUS, from the ramus and tuber ischii, ascend along the ischium and pubis, and are united immediately before the cartila-

ginous arch of the pubis;—they are covered by a strong, white, shining, fibrous, ligamento-tendinous substance, which is very elastic. Internally they are cavernous, and are separated from each other by a septum, which, from being perforated, is named *Septum pectiniforme*.

By the union of the corpora cavernosa, two grooves are formed:—(1.) A smaller one above, in which two arteries pass, a large vein or two betwixt them, and some large twigs of nerves. (2.) A larger groove below, which receives the urethra.

9. The VESICA URINARIA, or URINARY BLADDER, is situated within the pelvis, immediately behind the ossa pubis, and before the rectum. It is covered on its upper and back part by a reflection of peritoneum: in front and below (where it is contiguous to the rectum,) it is connected by cellular membrane to the surrounding parts. *Shape*, oval, but flattened before and behind, and, while in the pelvis, somewhat triangular. *Divided* into the fundus or bottom, corpus or body, and cervix or neck. In the contracted state, the fundus is the broadest and roundest part, but, when distended, the cervix is broader than any other part. At the top of the bladder, above the symphysis pubis, may be observed, the superior ligament of the bladder, consisting of the *Urachus*, a ligamentous cord, which runs up between the peritoneum and linea alba, as far as the navel,* and two of the ligamentous cords, which are the remains of the umbilical arteries, and run up from the sides of the bladder. The ligamentum inferius vesicæ connects the bladder to the upper and inner side of the ossa pubis.

Observe the parts of the bladder not covered by peritoneum; as they are the situations of surgical operations. These are the whole *anterior surface*, lying against the pubis, and rising above it, when the

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* In the fœtus, it is a prolongation or production of the coats of the bladder.

bladder is distended, so that it may be punctured above the pubis;—the *sides*, at the very lowest part of which the incision is made in the lateral operation of lithotomy, and where the viscus may be punctured from the perineum;—and the inferior surface, resting on the rectum, and allowing us to puncture from it. Observe also the direction of the axis of the bladder, in conformity with which all instruments should be introduced.

10. The entrance of the ureters into the bladder on the outside of the vesiculæ seminales.

11. The rectum, following the curve of the os sacrum, and os coccygis.

12. The prepuce is a fold of skin forming a sheath or covering for the glans penis. It makes a duplicature extending along the flat part of the glans from its basis to the orifice of the urethra, termed FRÆNUM PRÆPUTII.

To have a more connected view of the relative situation of these important parts, one side of the pelvis should now be removed, by dividing the symphysis pubis, and by sawing through the os ileum, or separating it at its junction with the sacrum. By carefully removing all the cellular membrane, the student will be enabled more accurately to examine the situation of the parts above described.

OF THE SCROTUM.

The scrotum consists externally of a loose, rugose skin, and internally of condensed cellular membrane, which has been described as a muscle, under the name of Dartos.

On dividing the anterior part of the scrotum, on either side of the raphe, we expose,

1. The Testicle, a gland of an oval flattened form,

covered by the tunica vaginalis, having on its upper edge an appendage termed Epididymis.

2. The Spermatic Chord, connecting the testicle to the abdominal ring. It consists of,

a, The spermatic artery, a branch of the aorta; this divides into several branches, which enter the upper edge of the testicle.

b, The spermatic veins, which form a plexus, that terminates in the abdomen, in a single vein.

c, The spermatic nerves, which come from the intercostal and lumbar nerves.

d, The vas deferens, or excretory duct of the testicle;—this is situated in the back part of the chord, and is distinguished by its firm cartilaginous feel.

e, The spermatic absorbents.

f, These parts are all connected by cellular membrane, and by the tunica vaginalis, which is covered by a thin muscle.

g, The cremaster;—this arises from the obliquus descendens internus, and is lost on the tunica vaginalis.

The internal proper covering of the testicle is a serous coat, and is denominated the tunica albuginea.

CHAPTER III.

DISSECTION OF THE ORGANS OF GENERATION IN THE FEMALE.

PREVIOUS to the dissection, it will be proper to examine the external parts.

The MONS VENERIS is a rounded prominence, covered with hairs after puberty, situated at the lower part of the belly, and arising on each side gradually from the groins; it consists of the common

integuments, with an additional quantity of cellular and adipose substance, and lies upon the fore part of the ossa pubis.   From the inferior part of the mons veneris arise

The LABIA EXTERNA, called also the labia or alæ pudendi:—they are continued downwards and forwards in the direction of the symphysis pubis, and terminate in the perineum anterius: they consist of integuments, cellular substance, and fat,—are thicker above than below,—and are red and vascular on their inner side. The places where the labia are joined to each other above and below, are termed Commissures.

The longitudinal cavity or fissure, situated betwixt the labia, and extending from the mons veneris to the perineum anterius, is sometimes called the SINUS PUDORIS; it is broader above than below, and contains several other parts.

On separating the labia, we see, immediately below the superior commissure,

The CLITORIS, a red projecting body, situated below the arch of the pubis, and partly covered by its PREPUCE: The prepuce is a fold of skin, continued from the inner surface of the labia, so as to cover the superior and lateral parts of the clitoris.—The clitoris resembles the penis of the male, and consists of two cavernous bodies; these cannot, however, be traced in this stage of the dissection.   That part of the body which forms an obtuse projection externally, is called the GLANS.

The PERINEUM ANTERIUS is that portion of the soft parts which extends from the inferior commissure of the labia to the anus.

The PERINEUM POSTERIUS is the space betwixt the anus and point of the os coccygis.

The NYMPHÆ are two prominent doublings of the integuments, extending from the glans of the clitoris to the sides of the vagina.   Their external side is con-

tinued from the inner surface of the labia, and from
the prepuce of the clitoris, while their internal surface
seems immediately continued from the fine, thin, vas-
cular integuments covering the clitoris itself; they are
spongy, and consist internally of cellular and adipose
substance.

A little lower we see the orifice of the urethra; it is
situated below the clitoris and arch of the pubis, be-
twixt the nymphæ, and above the orifice of the vagina:
it consists of a small rising prominence like a pea, in
the centre of which is a small opening or hole.

On each side of the orifice of the urethra, we meet
generally with the orifices of two mucous glands, which
by some are named COWPER's GLANDS of the female.

On separating the lower part of the labia pudendi,
we see the VESTIBULUM, a space which leads to the
vagina; it is bounded behind, by the carunculæ myrti-
formes, or by the hymen in virgins; on the sides, by
the labia; before, by the perineum anterius, which pro
jects forwards, forming a kind of valve, so that a little
pit is formed behind it, which is termed Fossa Navi-
cularis, or Scaphoides.

The HYMEN, or Circulus Membranosus, is a thin
and extensile membrane, formed by a doubling of the
inner surface of the vestibulum and lower part of the
vagina, the entrance of which is by its means much
contracted in virgins. It generally has an opening in
its upper part, but it is completely ruptured in the first
coitus: its form is various, frequently semilunar, and
then its base is attached to the vestibulum, while its
cornua extend upwards as far as the sides of the
urethra.

After the destruction of the hymen, in married
women, we see some irregular projections marking
the orifice of the vagina, and termed CARUNCULÆ
MYRTIFORMES: they are generally supposed to be

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the remains of the hymen, but are not exactly in the same situation.

Behind these is the VAGINA, or canal leading to the uterus; at the extremity of which may be felt projecting the Os INTERNUM UTERI, or Os TINCÆ, but it cannot be seen without dissection.

The skin should now be divided on the side of the right labium, and the dissection should be carried from the groin to the side of the anus; the cellular membrane must be carefully removed, in order to expose the following parts.

We find the CLITORIS consisting of two spongy bodies termed Crura, which unite and form the body. The crus of each side is a cavernous body, arising from the ramus and upper part of the tuberosity of the ischium, continued along the ramus of the os pubis, and uniting with its fellow opposite to the symphysis pubis. The body formed by the crura does not extend upwards, but forms a curve downwards towards the urethra; it is divided internally by the SEPTUM PECTINIFORME, and is attached to the spmphysis pubis by a suspensory ligament: it is invested by a ligamentous membrane.

The muscles which are met with in this dissection consist of four pair, and two single muscles.

The ERECTOR CLITORIDIS,
    TRANSVERSUS PERINÆI,
    LEVATOR ANI,
    COCCYGEUS,   } on each side.

The SPHINCTER ANI,
    SPHINCTER VAGINÆ, } two single muscles.

1. The ERECTOR CLITORIDIS *arises*, fleshy and tendinous, from the tuber ischii, from the inside of the ramus of the os ischium, and from the ramus of the os pubis: It passes over the crus of the clitoris, and becoming tendinous, is lost upon it.

Arising from the same point, and surrounded by much cellular membrane, we find,

2. The TRANSVERSUS PERINÆI.—Its *origin* is the same as in the male.

It is *inserted* into a ligamentous substance in the perineum anterius, at the point where the sphincter ani and sphincter vaginæ meet.

This ligamentous or tendinous substance deserves attention. Here, as in the male, it is the point of union into which different muscles are inserted.

This muscle serves to sustain the perineum.

3. Surrounding the extremity of the vagina, and a small part of the vestibulum, we find the SPHINCTER VAGINÆ; it *arises* anteriorly, from the crura of the clitoris on each side; it surrounds the orifice of the vagina, and is

Inserted into the ligamentous point of the perineum, where the fibres of each side meet, and are connected with those of the transversi perinæi, and with the sphincter ani.

It contracts the mouth of the vagina, and compresses the plexus retiformis.

4. The SPHINCTER ANI exactly resembles the same muscle in the male.

5. The LEVATOR ANI resembles the same muscle of the male; it surrounds the sides of the vagina in part, and consequently assists in constricting and supporting it.

6. The COCCYGEUS is longer than in the male, from the greater transverse diameter of the inferior aperture of the pelvis.

Under the fibres of the sphincter vaginæ, you will find the PLEXUS RETIFORMIS, or CORPUS CAVERNOSUM VAGINÆ, a spongy body, consisting of cellular substance, interwoven with a number of convoluted blood-vessels; it arises from the sides of the clitoris, passes on each side of the extremity of the vagina, is

not continued completely around it, but is lost on its posterior part.

The VAGINA is the canal leading from the vestibulum to the uterus. It lies betwixt the rectum and inferior surface of the urethra and bladder, and is connected to them by cellular membrane. It is composed of fibrous substance, partly ligamentous, and perhaps in part muscular; its inner surface is rugose, vascular, and occupied by mucous glands. On slitting it up, we see, at its posterior extremity, the Os Uteri, a rounded projection, with a transverse fissure.

The UTERUS, or WOMB.—This organ is best seen from the cavity of the abdomen. It is situated betwixt the bladder and rectum, to both of which it is connected by reflections of peritoneum; it is of the shape of a pear, somewhat flattened, inwardly hollow, outwardly of a whitish color, and of a firm consistence. The broad upper part of the womb is called the Fundus Uteri, the narrower part is named the neck, or Cervix Uteri, and the intermediate part its Body.

The uterus has four ligaments, two on each side:

1. The LIGAMENTUM TERES, or Round Ligament. It is a round long cord, extending from the side of the fundus uteri, and passing through the abdominal ring, to be lost in the groin.

The LIGAMENTUM LATUM, or Broad Ligament, is a broad fold of peritoneum, reflected from the body of the uterus, and connecting it on the sides of the pelvis. The uterus, together with its two broad ligaments, divides the pelvis into an anterior and posterior half; in the former of which is the bladder, and in the latter the rectum. The duplicature of the broad ligament encloses the Fallopian tube, ovary, and round ligament.

The FALLOPIAN TUBES are two. Each tube is contained in the upper part of the doubling of the broad ligament; it goes out from the fundus of the womb, and

is a slender hollow tube: its outer end is curved downwards and backwards, and terminates by a broad fringed extremity, termed MORSUS DIABOLI, or the FIMBRIÆ. This broad extremity is connected to the next pair of organs.

The OVARIA are two small oval bodies, white and flat, situated by the sides of the uterus, and inclosed in the posterior fold of the broad ligament behind the Fallopian tube; each ovarium is connected to the fundus uteri by a short and round ligament.

The BLADDER is situated before the uterus, and is described in the preceding chapter.

The URETHRA is short in females, and near the bladder is surrounded by a spongy fleshy substance, is connected to the cartilaginous arch of the pubis by the ligamentum inferius vesicæ.

The URETER descends from the kidneys over the psoas muscle; it runs for some space betwixt the bladder and vagina, and at last perforates the bladder near the neck.

The RECTUM lies behind the uterus. See the preceding chapter.

To obtain a more satisfactory knowledge of the relative situation of the parts, the left side of the pelvis should be removed as in the male, and the parts examined in that situation.

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CHAPTER. IV.

DISSECTION OF THE THIGH.

SECTION. I.

OF THE ANTERIOR PART OF THE THIGH.

Of the Fascia, cutaneous vessels, and nerves.

BENEATH the integuments, you will find a strong fascia, or aponeurotic expansion, investing the whole thigh, called the FASCIA LATA FEMORIS. It consists partly of tendinous, partly of ligamentous fibres; surrounds and covers all the muscles, and sends septa or partitions between them:—It is very strong, smooth, and tendinous on the outer part of the thigh; but, on the anterior and inner part, it is very thin, and of a cellular texture. Consequently to demonstrate the whole extent of this fascia, it should be first exposed on the outside of the thigh, and the dissection continued carefully inwards on the fore-part, where it is with difficulty distinguished from the common cellular membrane.

But, in removing the common integuments from the fore part of the thigh, it will be proper to attend to some parts which are situated above the fascia.

1. The VENA SAPHENA MAJOR is seen running up on the inside of the knee and thigh. At first it lies very superficial, betwixt the skin and fascia. As it ascends, it is gradually enveloped by the fibres of the fascia, and then sinks beneath it to join the femoral

vein about an inch below Poupart's ligament, receiving in its course, several cutaneous veins.

2. Immediately under the true skin, and more superficial than the veins or nerves, you may occasionally perceive the LYMPHATIC VESSELS running, like lines of a whitish colour, to enter the inguinal glands: they are more numerous on the fore part, than on the outside of the thigh.

3. Several CUTANEOUS NERVES proceeding from the lumbar or anterior crural nerve, are seen ramifying above the fascia.

The fascia may now be exposed distinctly. Observe how extensively it arises from the bones, tendons, and ligaments. On the anterior and superior part of the thigh, it arises from Poupart's ligament,* from the os pubis, the descending ramus of that bone, and the ascending ramus and tuberosity of the ischium;—behind, and on the outside, from the whole spine of the ilium, and from the sacro-sciatic ligaments. It receives a number of fibres from a muscle belonging to it, viz.: the tensor vaginæ femoris, and from the tendon of the gluteus maximus;—passing down over the whole thigh, it is firmly fixed to the linea aspera, the condyles of the femur, and the patella, and is continued over the knee, to be attached to the heads of the tibia and fibula, and form the fascia of the leg.

On the upper and anterior part of the thigh, there is a slight hollow, where the great vessels descend under the crural arch. The fascia lata forms just on the outside and upper part of this, a crescent-shaped fold, called its *semilunar edge*, which is strongly connected to the crural arch, and sometimes contributes to the strangulation in femoral hernia.

* At this part the fascia of the thigh is covered by a more superficial expansion, which lies over the lower part of the aponeurosis of the external oblique muscle, completely covers the crural arch, and descends some little way beyond the bend of the thigh. It has been called the *superficial fascia.*

The fascia should now be dissected back; and, in lifting up the thicker part of it, which covers the outside of the thigh, you may observe that it is composed of two laminæ of fibres, the fibres of the outer lamina run in circles round the thigh, while those on the inner, stronger, and more firmly connected, run longitudinally.

The muscles on the anterior part of the thigh are nine in number.

1. The TENSOR VAGINÆ FEMORIS—*Arises*, by a narrow, tendinous, and fleshy origin, from the external part of the anterior superior spinous process of the os ilium: it forms a considerable fleshy belly, and extending downwards and backwards, is

Inserted into the inner lamina of the great fascia, where it covers the outside of the thigh, and a little below the trochanter major.

This muscle, called also the Fascialis, serves to stretch the great fascia of the thigh, to assist in the abduction of the thigh, and in its rotation inwards.

2. THE SARTORIUS—*Arises*, by short tendinous fibres, from the anterior superior spinous process of the os ilium, soon becomes fleshy, extends obliquely across the thigh, and passes behind the inner condyle.

Inserted, by a broad and thin tendon, into the inner side of the tibia, immediately below its anterior tubercle.

This muscle lies before the muscles of the thigh, crossing them like a strap about two inches in breadth, and serves to flex the leg obliquely inwards on the thigh, and to bend the thigh forwards.

3. The RECTUS FEMORIS—*Arises*, by a strong tendon, from the inferior anterior spinous process of the os ilium; and, by another strong tendon, from the dorsum of that bone a little above the acetabulum, and from the capsular ligament of the hip-joint. The two tendons soon unite, and send off a large belly,

which runs down over the anterior part of the thigh, forming a complete peniform muscle, and terminates in a flat but strong tendon, which is

Inserted into the upper extremity of the patella; where a thin aponeurosis is sent from it over the fore part of that bone, to terminate on the strong ligament which connects the lower part of the patella to the tibia, and is called Ligamentum Patellæ.

It serves to extend the leg on the thigh, to bend the thigh on the pelvis, and to bring the pelvis and thigh forwards on the leg.

Under the rectus, and partly covered by it, there is a large mass of flesh, which, at first sight, appears to form but one muscle. It may, however, be divided into three; the separation on the external surface is not generally very evident, but, by following the course of the vessels which enter this mass, and by cutting through perhaps a few fibres externally, you will discover the line of separation, and this separation, as you proceed deeper with your dissection, will become very distinct. The three muscles are named vastus externus, vastus internus, and cruræus: at the upper and middle parts of the thigh, they may be separated very distinctly; but for two or three inches above the condyles, they are inseparably connected.

4. The VASTUS EXTERNUS—*Arises*, tendinous and fleshy, from the anterior surface of the root of the trochanter major, from the outer edge of the linea aspera, its whole length,—from the oblique line running to the external condyle,—and from the whole external flat surface of the thigh bone. The fleshy fibres run obliquely forwards.

Inserted into the external surface of the tendon of the rectus cruris, and into the side of the patella:— Part of its ends likewise in an aponeurosis which passes over the side of the knee to the leg, and is

firmly fixed to the head of the tibia, closely adhering to the capsule of the knee-joint.

It extends the leg, or brings the thigh forward upon the leg.

5. The VASTUS INTERNUS—*Arises*, tendinous and fleshy, from the fore-part of the root of the trochanter minor, from all the upper edge of the linea aspera from the oblique line running to the inner condyle, and from the whole internal surface of the thigh bone. Its fibres descend obliquely downwards and forwards.

Inserted into the lateral surface of the tendon of the rectus cruris, and into the side of the patella; it also sends off an aponeurosis, which is continued down to the leg, and covers the inner part of the capsule of the knee.

6. The CRURÆUS, or CRULALIS.—The principal part of this muscle is lapped over, and concealed, by the bellies of the two vasti; and the small part, which is seen projecting between the anterior edges of those muscles, lies behind the belly of the rectus cruris.

Arises, fleshy, from between the two trochanters of the os femoris, from all the fore-part of the bone, and from the outside as far back as the linea aspera; but from the inside of the bone it does not arise, for between the forepart of the femur and the inner edge of the linea aspera, there is a smooth plain surface, of the breadth of an inch, extending nearly the whole length of the bone, from which no muscular fibres arise.

Inserted into the posterior surface of the tendon of the rectus, and the upper edge of the patella.

7. The GRACILIS *arises*, by a broad thin tendon, from the lower half of that part of the os pubis which forms the symphysis, and from the inner edge of the descending ramus:—It soon grows fleshy, and forms a belly, which becoming narrower as it descends, terminates in a tendon, which passes behind the inner con-

dyle of the thigh bone, and is reflected forwards, to be

Inserted in the inside of the tibia below the tendon of the sartorius, and above that of the semitendinosus.

It serves to bring the thigh inwards and forwards, and assists in bending the leg.

8. The PECTINALIS—*Arises*, fleshy from that ridge of the os pubis which forms the brim of the pelvis, and from the concave surface below the ridge. It forms a thick flat belly,

Inserted, by a flat tendon into the linea aspera, immediately below the less trochanter.

Its origin lies on the inside of the belly of the psoas magnus, where that muscle slides over the brim of the pelvis, and on the outside of the origin of the adductor longus. It bends the thigh forwards, moves it inwards, and performs rotation, by turning the toes outwards.

9. The TRICEPS ADDUCTOR FEMORIS consists of three distinct muscles, which, passing from the pelvis to the thigh, lie in different layers upon one another, and have nearly the same action.

(1.) The ADDUCTOR LONGUS, or PRIMUS—*Arises*, by a short strong tendon, from the upper and fore part of the os pubis, near its symphysis;—forms a large triangular belly, which, as it descends, becomes broader, but less thick.

Inserted, tendinous, into the middle part of the linea aspera, occupying rather more than one-third of its length.

(2.) The ADDUCTOR BREVIS, or SECUNDUS—*Arises*, fleshy and tendinous, from the os pubis, between the lower part of the symphysis pubis, and the foramen thyroideum:—it forms a fleshy belly,

Inserted, tendinous, into the upper third of the linea aspera, that is, from the root of the less trochanter to the commencement of the insertion of the next muscle.

(3.) The ADDUCTOR MAGNUS, or TERTIUS.—*Arises*, principally fleshy, from the lower part of the body and the descending ramus of the os pubis, and from the ascending ramus of the ischium, as far as the tuberosity of that bone. The fibres run outwards and downwards, having various degrees of obliquity.

Inserted, fleshy, into the whole length of the linea aspera, into the oblique ridge above the internal condyle of the os femoris, and, by a roundish long tendon, into the upper part of that condyle.

This large muscle arises behind and below the two other adductors; it forms a flat partition betwixt the muscles on the fore and back parts of the thigh.

All these muscles serve to approximate the thighs to each other, and to roll them outwards. The two anterior heads will bend the thigh; the posterior will extend it, if it be bent forwards.

SECTION II.

OF THE POSTERIOR PART OF THE THIGH.

Of the fascia.

ABOVE that part of the great fascia which invests the thigh posteriorly, we meet with several cutaneous nerves. They are of little importance, taking their origin either from the lumbar nerves, and passing over the spine of the os ilium, or from the great sciatic nerve, and emerging from the lower margin of the gluteus maximus. Other twigs come from the sacral nerves, and from the sciatic in its course down the thigh.

The muscles situated on the posterior part of the thigh are eleven.

On removing the integuments and fascia from the hip, we expose

1. The GLUTEUS MAXIMUS.—It *arises*, fleshy, from the posterior third of the spine of the os ilium, from the whole lateral surface of the sacrum, below the posterior spinous process of the ilium; from the back part of the posterior or inferior sacro-sciatic liga-ment,* over which the edge of this muscle hangs in a folded manner, and from the lateral surface of the os coccygis.

The fleshy fibres proceed obliquely forwards and downwards, forming a thick broad coarse muscle, and converging gradually, terminate in a strong flat tendon. This tendon slides over the posterior part of the trochanter major; sends off a great quantity of tendi-nous fibres, to be inseparably joined to the fascia lata of the thigh; and is

Inserted, into a rough surface at the upper and outer part of the linea aspera, immediately below the tro-chanter major; also very extensively into the fascia lata, which covers the former insertion.

This muscle is quite superficial, covering all the other muscles which are situated on the back part of the hip, covering also the tuber ischii, and the ten-dons of the muscles which arise from that projection.

It is used to restore the thigh, after it has been bent;—to rotate it outwards; to extend the pelvis on the thigh, and maintain it in that position in the erect posture of the body.

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* The sacro-sciatic ligaments are two in number; they pass between the ischium and sacrum.

1. The external or inferior, or posterior, sacro-sciatic ligament arises from the external edge of the transverse processes of the sacrum, descends obliquely, and is inserted into the tuberosity of the os ischium.

2. The internal, or anterior, arises from the edge of the transverse processes of the sacrum, and of the os coccygis; it passes across on the inside of the external, and is inserted into the point of the spinous process of the ischium.

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By raising this muscle from its origin, we expose

2. The Gluteus Medius—*Arises*, fleshy, from all the outer edge of the spine of the os ilium, as far as the posterior tuberosity; from the dorsum of the bone, between the spine, and semicircular ridge (which passes from the anterior superior spinous process to the ischiatic notch;) also from the rough surface which extends from the anterior superior to the anterior inferior spinous process, and from the inside of a fascia which covers its anterior part. The fibres converge into a strong and broad tendon, which is

Inserted into the upper and outer part of the great trochanter.

The posterior part of the belly, and the tendon of this muscle, are concealed by the gluteus maximus, but the anterior and largest part is superficial, being covered only by a fascia.

Having lifted up this muscle from its origin, you will discover,

3. The Gluteus Minimus.—It is entirely concealed by the gluteus medius, and between their tendons there is a bursa mucosa.

It *arises*, fleshy, from the semicircular ridge of the ilium, and from the dorsum of the bone below the ridge within half an inch of the acetabulum. Its fibres run in a radiated direction towards a strong tendon, which is

Inserted into the anterior and superior part of the great trochanter.

4. The Pyriformis—*Arises*, within the pelvis, by three tendinous and fleshy origins, from the second, third, and fourth false vertebræ or divisions of the sacrum. It forms a thick belly, which passes out of the pelvis, below the niche in the posterior part of the ilium, (from which it receives a few fleshy fibres,) and above the superior sacro-sciatic ligament.

Inserted, by a roundish tendon, into the uppermost part of the cavity at the root of the trochanter major.

Like the other small muscles of the hip, it is entirely concealed by the gluteus maximus; its belly lies behind and below the gluteus medius, but is not at all covered by it, and above the superior gemellus. Sometimes the pyriformis is divided into two distinct muscles, by a branch of the great sciatic nerve.

It moves the thigh a little upwards, and rolls it outwards.

5. The GEMINI consist of two heads which are distinct muscles.

(1.) The superior arises from the back part of the spinous process of the ischium.

(2.) The inferior from the upper part of the tuberosity of the os ischium, and the anterior surface of the posterior sacro-sciatic ligament.

Inserted, tendinous and fleshy, into the cavity at the root of the trochanter major, immediately below the insertion of the pyriformis, and above the insertion of the obturator externus.

They lie below the pyriformis, and above the quadratus femoris; they are united by a tendinous and fleshy expansion, which forms a purse or sheath for the tendon of the obturator internus.

They serve to roll the thigh outwards, and to bind down the tendon of the obturator internus.

Lying between the bellies of the gemini, you will perceive,

6. The OBTURATOR INTERNUS, once called marsupialis.—It *arises*, tendinous and fleshy, from more than one-half of the internal circumference of the foramen thyroideum, and from the inner surface of the ligament which fills up that hole; its inside is covered by a portion of the levator ani; it forms a flattened tendon, which passes out of the pelvis in a sinuosity

betwixt the spinous process and tuberosity of the ischium; and, becoming rounder, is

Inserted into the pit at the root of the trochanter major.

Its origin lying within the pelvis, cannot be exposed till the contents of that cavity are removed.

7. The QUADRATUS FEMORIS—*Arises*, tendinous and fleshy, from an oblique ridge, which descends from the inferior edge of the acetabulum along the body of the ischium, between its tuberosity and the foramen thyroideum: its fibres run transversely, to be

Inserted, fleshy, into a rough ridge on the back part of the femur, extending from the root of the greater trochanter to the root of the less.

Situation: It is concealed by the gluteus maximus, lies below the inferior head of the gemini, and above the superior fibres of the adductor magnus; its origin is in contact with the origin of the hamstring muscles.

It rolls the thigh outwards.

On lifting up the quadratus femoris from its origin, and leaving it supended by its insertion, you discover, running in the same direction, the strong tendon of,

8. The OBTURATOR EXTERNUS.—This muscle *arises*, fleshy, from almost the whole circumference of the foramen thyroideum, and from the external surface of the obturator ligament; its fibres pass outwards through the notch placed between the inferior margin of the acetabulum and the tuberosity of the ischium, wind around the cervix of the os femoris, adhering to the capsular ligament, and terminate in a strong tendon, which is

Inserted into the lowermost part of the cavity, at the root of the trochanter major, immediately below the insertion of the inferior head of the gemini.

This muscle cannot be distinctly seen, until all the muscles which run from the pelvis to the upper part

of the thigh are removed, both on the fore and back part.

It rolls the thigh bone obliquely outwards.

9. The BICEPS FLEXOR CRURIS—*Arises* by two distinct heads; the first, called the LONG HEAD, arises in common with the semitendinosus, by a short tendon, from the outer part of the tuberosity of the ischium, and, descending, forms a thick fleshy belly. The second, termed the SHORT HEAD, arises, tendinous and fleshy, from the linea aspera, immediately below the insertion of the gluteus maximus; and from the oblique ridge running to the outer condyle, where it is connected with the fibres of the vastus externus. The two heads unite at an acute angle, a little above the external condyle, and terminate in a strong tendon which is

Inserted into a rough surface on the outside of the head of the fibula.

The biceps cruris, as it is called, bends the leg, and particularly by means of its short head twists the leg outwards in the bent state of the knee.

10. The SEMITENDINOSUS—*Arises*, tendinous, in common with the long head of the biceps, from the tuberosity of the ischium; it has also some fleshy fibres arising from that projection more outwardly:—as it descends, it arises, for two or three inches, fleshy, from the inside of the tendon of the biceps; forms a thick belly, and terminates at the distance of three or four inches from the knee in a long round tendon, which becoming flat, passes behind the head of the tibia, and is reflected forwards, to be

Inserted into the anterior angle of that bone, some little way below its tubercle, and below the tendon of the gracilis. The belly of this muscle is intersected, about its middle, by a narrow transverse tendinous line.

It bends the leg backwards, and slightly inwards.

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11. The SEMIMEMBRANOSUS—*Arises*, by a strong round tendon, from the upper and outer part of the tuberosity of the ischium; the tendon, soon becoming broader, sends off obliquely a fleshy belly; this muscle is continued, fleshy, much lower down than that last described. The fleshy fibres terminate obliquely in another flat tendon, which passes behind the inner condyle, sends off a thin aponeurotic expansion under the inner head of the gastrocnemius, to cover the posterior part of the capsule of the knee-joint, and to be affixed to the external condyle: the tendon then becoming rounder, is

Inserted into the inner and back part of the head of the tibia.

This is a semi-penniform muscle; and serves to bend the leg backwards.

The last two muscles properly form the inner hamstring; but some enumerate among the tendons of the inner hamstring, the sartorius and gracilis.

CHAPTER. V.

DISSECTION OF THE LEG AND FOOT.

SECTION I.

OF THE FORE PART OF THE LEG AND FOOT.

On dissecting off the integuments from the fore part of the leg, we find a strong fascia continued from the thigh; it adheres firmly to every projecting point of bone, to the head and spine of the tibia, and to the fibula; it grows thinner towards the lower part of the leg; but where it passes over the ankle, it again becomes very strong by its adhesions to the outer and

inner ankle, and forms a strong ANNULAR or TRANS-
VERSE LIGAMENT, which binds down the tendons, and
is evidently but a thicker and stronger part of the
general fascia of the leg.   This annular ligament seems
to consist of two distinct cross bands, which, going
from the point of the outer ankle and neighboring part
of the os calcis, are fixed to the malleolus internus,
and to the inside of the os naviculare.

Before removing the fascia, it will be proper to
remark,

1. The vena saphena major, running upon the inside
of the tibia, and accompanied by a cutaneous nerve,
the nervus saphenus.

2. Several cutaneous nerves, branching on the outer
and fore-part of the leg and foot, and derived from the
nervus peroneus.

The fascia should then be dissected off; and, in
doing this, remark, that it is firmly attached to the
bones, and also to the bellies of the muscles at the
upper part of the leg, so that their surfaces appear
ragged, where the fibres are separated which arose
from the inside of the fascia: Remark also, that it
sends down processes between the muscles; these are
named intermuscular ligaments, or tendons; they give
origin to the fibres of all the muscles betwixt which
they pass, connecting them together inseparably, so
that the dissection is difficult, and has a rough appear-
ance.

MUSCLES SITUATED ON THE FORE PART AND OUT-
SIDE OF THE LEG.

THESE are six in number.

1. The TIBIALIS ANTICUS—*Arises*, principally
fleshy, from the exterior surface of the tibia, from its
anterior angle or spine, and from nearly half of the
interosseous ligament; from these surfaces it continues

to arise down two-thirds of the length of the bone; also from the inner surface of the fascia of the leg, and from the intermuscular ligaments. The fleshy fibres descend obliquely, and terminate in a strong tendon, which crosses from the outside to the fore-part of the tibia, passes through a distinct ring of the annular ligament near the inner ankle, runs over the astragulus and os naviculare, and is

Inserted into the upper and inner part of the os cuneiforme internum, and the base of the metatarsal bone supporting the great toe.

It draws the foot upwards and inwards; or, in other words, bends the ankle-joint.

2. EXTENSOR LONGUS DIGITORUM PEDIS—*Arises*, tendinous and fleshy, from the outer part of the head of the tibia; from the head of the fibula; from the anterior angle of the fibula almost its whole length; and from part of the smooth surface between the anterior and internal angles; from a small part of the interosseous ligament; from the fascia and intermuscular ligaments.

Below the middle of the leg, it splits into four round tendons, which pass under the annular ligament, become flattened, and are

Inserted into the root of the first phalanx of each of the four small toes, and expanded over the upper side of the toes as far as the root of the last phalanx.

This muscle also runs entirely superficial; it lies between the tibialis anticus and peroneous longus, being firmly connected to them by intermuscular ligaments; but, at the lower part of the leg, it is separated from the tibialis anticus by the extensor pollicis longus, and from the peroneus longus by the peroneus brevis.

It extends all the joints of the four small toes; and bends the ankle joint.

3. PERONEUS TERTIUS—*Arises*, fleshy, from the anterior angle of the fibula, and from part of the smooth surface between the anterior and internal angles, extending from below the middle of the bone downwards to near its inferior extremity;—sends its fleshy fibres forwards to a tendon, which passes under the annular ligament in the same sheath as the extensor digitorum longus, and is

Inserted into the base of the metatarsal bone that supports the little toe.

The belly of this muscle is inseparably connected with the extensor longus digitorum, and is properly its outer part; it lies between that muscle and the peroneus brevis. The tendon runs down on the out-side of that tendon of the extensor longus digitorum which goes to the little toe. The whole of the muscle is superficial.

4. EXTENSOR PROPRIUS POLLICIS PEDIS—*Arises*, tendinous and fleshy, from part of the smooth surface between the anterior and internal angles of the fibula, and from the neighbouring part of the interosseous ligament, extending from some distance below the head of the bone to near its inferior extremity; a few fibres also arise from the lower part of the tibia; the fibres pass obliquely downwards and forwards into a tendon, which, inclining inwards, passes over the fore-part of the astragalus and os naviculare, and over the junction of the os cuneiforme internum and os cuneiforme medium, to be

Inserted into the base of the first and of the second phalanges of the great toe.

This is a very slender muscle; its belly is concealed between the tibialis anticus and extensor digitorum longus, and cannot be seen till those muscles are separated from one another;—the tendon is superficial, running between the tendons of those two muscles.

It serves to extend the great toe; and to bend the ankle.

The PERONEUS LONGUS—*Arises*, tendinous and fleshy, from the fore-part and outside of the head of the fibula, and from the adjacent part of the tibia, from the external angle of the fibula, and from the smooth surface between the anterior and external angles as far down as one-third of the length of the bone from its lower extremity; also from the fascia of the leg and intermuscular ligaments. The fibres run obliquely outwards into a tendon, which passes behind the outer ankle, through a grove in the lower extremity of the fibula: it is then reflected forwards through a superficial fossa in the outside of the os calcis, passes over a projection, runs in a groove in the os cuboides, passes over the muscles in the sole of the foot, and is

Inserted, tendinous into the outside of the base of the metatarsal bone that sustains the great toe, and into the os cuneiforme internum.

The tendon of this muscle is superficial where it crosses the outside of the os calcis, but in the sole of the foot it is concealed by the muscles situated there, and will be seen in the dissection of that part.

It extends the ankle-joint, and turns the sole of the foot outwards.

6. The PERONEUS BREVIS—*Arises*, fleshy from the outer edge of the anterior angle of the fibula, and from part of the smooth surface behind that angle; beginning about one-third down the bone, and continuing its adhesion to near the ankle; from the fascia of the leg, and from the intermuscular ligaments:— The fibres run obliquely towards a tendon, which passes through the groove of the fibula behind the outer ankle, being there inclosed in the same ligament with the tendon of the peroneus longus, then through a separate groove on the outside of the os calcis, and is

Inserted into the external part of the base of the metatarsal bone that sustains the little toe.

This muscle arises between the extensor longus digitorum and peroneus longus; its belly is overlapped, and concealed by the belly of the peroneus longus; but, as it continues fleshy lower down, it is seen, above the ankle, projecting on each side of the tendon of that muscle:—Below, it is separated from the peroneus tertius by that projection of the fibula which forms the outer ankle, and which is only covered by the common integuments.

It has the same use as that of the peroneus longus.

MUSCLES ON THE UPPER PART OF THE FOOT.

Only one muscle is found in this situation.

EXTENSOR BREVIS DIGITORUM PEDIS—*Arises*, fleshy and tendinous, from the anterior and upper part of the os calcis, from the os cuboides, and from the astragalus; forms a fleshy belly, divisible into four portions; these send off four slender tendons, which are

Inserted, the first tendon, into the first phalanx of the great toe; and the other three into all the small toes, except the little one, uniting with the tendons of the extensor digitorum longus, and being attached to the upper convex surface of all the phalanges.

The belly of this muscle lies under the tendons of the extensor digitorum longus and peroneus brevis; it is not, however, concealed, but is seen projecting behind and betwixt these tendons; it assists in forming the tendinous membrane which invests the upper surface of all the phalanges of the toes.

Its use is to extend the toes.

It is sometimes described as two muscles, the extensor brevis pollicis pedis, and extensor brevis digitorum pedis.

SECTION II.

DISSECTION OF THE MUSCLES ON THE POSTERIOR PART OF THE LEG.

THE fascia investing the posterior part of the leg, is much thinner and less strong than that on the fore part.

The muscles to be described are seven in number.

1. The GASTROCNEMIUS EXTERNUS, or GEMELLUS, *Arises*, by two distinct heads:—The first, or Internal Head, arises, tendinous, from the upper and back part of the internal condyle of the os femoris, and fleshy from the oblique ridge over that condyle. The second, or External Head, arises, in the same manner, from the external condyle. Each of the heads forms a fleshy belly, the fibres of which are oblique, passing from a tendinous expansion which covers the posterior surface of the muscle, to another tendinous expansion which covers the anterior surface, or that surface which lies nearest the bones. The two bellies, of which the internal is much the larger, are separated by a considerable triangular space, in which the popliteal blood-vessels and nerves pass to the leg, but descending, they unite a little below the knee-joint in a middle tendinous line, and below the middle of the tibia send off a broad flat tendon, which unites a little above the ankle with the tendon of the soleus.

Reflect the two heads of the gastrocnemius from the femoral condyles, and you will then expose,

2. The SOLEUS, or GASTROCNEMIUS INTERNUS— which *arises*, by two origins or heads. The External, which is by far the larger, arises, principally fleshy, from the posterior surface of the head of the fibula, and from the external angle of that bone, for two-thirds of its length, immediately behind the peroneus longus. The internal head, arises, fleshy, from an oblique ridge

on the posterior surface of the tibia, just below the pop-
liteus, and from the inner angle of that bone, during the
middle third of its length.   The two heads which are
at first separated by the posterior tibial artery and
nerve, unite immediately, forming a large belly, which,
covered by the tendon of the gastrocnemius, is continu-
ed, fleshy, to within a short distance of the ankle-joint;
a little above which, the tendons of the gastrocnemius
and soleus unite, and form a strong round tendon, named
the TENDO ACHILLIS, which slides over the upper and
posterior part of the os calcis, where it is furnished
with a small bursa mucosa, to be

Inserted into a rough surface on the back-part of that
bone.

It serves to elevate the os calcis, and thereby to raise
the whole body, as a preparatory measure to its being
carried forward in progression; to carry the leg back-
wards on the foot when that is fixed; the gastrocnemi-
us, from its origin in the thigh, also bends the leg on
the thigh.

By detaching the heads of the gastrocnemius, you
will expose,

3. The PLANTARIS.—This muscle *arises*, fleshy,
from the upper part of the external condyle of the fe-
mur and its oblique ridge, forms a pyramidial belly
about three inches in length, which adheres to the
capsule of the knee-joint, runs over the popliteus, and
terminates in a long, slender, thin tendon.   This ten-
don passes obliquely inwards over the inner head of
the soleus, and under the gastrocnemius; emerges from
between those two muscles, where their tendons unite,
and then runs down by the inside of the tendo Achillis,
to be

Inserted into the posterior part of the os calcis, on
the inside of the insertion of the tendo Achillis, and
somewhat before it.

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The use of this muscle is not well understood: some say that it serves to tuck up the capsule in the great bendings of the knee-joint; others, that it assists the gastrocnemii.

4. The POPLITEUS—*Arises*, within the capsular ligament of the knee, by a round tendon, from a deep pit or hollow on the outer side of the external condyle; adheres to the posterior and outer surface of the external semilunar cartilage; passes, within the cavity of the joint, over the side of the condyle to its back part; perforates the capsular ligament, and forms a fleshy belly, which runs obliquely inwards, being covered by a thin tendinous fascia, to be

Inserted, broad, thin and fleshy, into an oblique ridge on the posterior surface of the tibia, a little below its head, and into the triangular space above that ridge.

This muscle is concealed entirely by the gastrocnemius, it lies above the inner head of the soleus; and is more deeply situated than the plantaris, which crosses over it.

It bends the leg, and when bent, rolls it, so as to turn the toes inwards.

The belly of the soleus should now be lifted, in order to expose the deeply-seated muscles. A strong membranous fascia is seen connecting and investing them, which is to be removed.

5. The FLEXOR LONGUS DIGITORUM PEDIS PERFORANS—*Arises*, fleshy, from the posterior flattened surface of the tibia, between its internal and external angles, below the attachment of the soleus, and continues to arise from the bone to within two or three inches of the ankle; the fibres pass obliquely into a tendon which is situated on the posterior edge of the muscle. This tendon runs behind the inner ankle in a groove of the tibia; passes under a strong ligament which goes from the inner ankle to the os calcis, and

having received a strong tendinous slip from the flexor pollicis longus, divides about the middle of the sole of the foot, into four tendons, which pass through the slits in the tendons of the flexor digitorum brevis, and are

Inserted into the extremity of the last joint of the four toes.

This muscle lies on the inside of the flexor longus pollicis, and serves to bend the last joint of the toes, and to assist in extending the foot.

6. FLEXOR LONGUS POLLICIS PEDIS—*Arises*, fleshy, from the posterior flat surface of the fibula, continuing its origin from some distance below the head of the bone to within an inch of the ankle. The fleshy fibres terminate in a tendon, which passes behind the inner ankle through a groove in the tibia; next through a groove in the astragalus, crosses in the sole of the foot the tendon of the flexor longus digitorum, to which it gives a slip of tendon; passes between the two sesamoid bones, and is

Inserted into the last phalanx of the great toe.

Its office is to bend the last joint of the great toe, and, being connected by a cross slip to the flexor digitorum communis, to assist in bending the other toes.

7. The TIBIALIS POSTICUS—*Arises*, fleshy from the posterior surface of both the tibia and fibula, immediately below the upper articulation of these bones with each other; from the whole of the interosseous ligament; from the angles of the bones to which that ligament is attached; and from the flat surface of the fibula behind its internal angle for more than two-thirds of its length. The fibres run obliquely towards a middle tendon, which, becoming round, passes behind the inner ankle through a groove in the tibia.

Inserted into the upper and inner part of the os naviculare, being further continued through a groove in

that bone to the internal and external cuneiform bones; it also sends some tendinous filaments to the os calcis, the os cuboides, and the bases of the metatarsal bones supporting the second and middle toe.

This muscle may be said to arise from the tibia and fibula before the interosseous ligament, as its fibres fill up a perforation in the upper extremity of that ligament. The belly is concealed at its lower part by the flexor longus digitorum and flexor pollicis, and cannot be seen till those muscles are separated. It extends the foot, and turns it inwards.

SECTION III.

DISSECTION OF THE SOLE OF THE FOOT.

THE cuticle on the sole of the foot from constant pressure is very much thickened; betwixt the integuments and plantar aponeurosis, we find a tough granulated fat, which adheres firmly to the aponeurosis, and is dissected off with difficulty.

APONEUROSIS, or FASCIA PLANTARIS, is a very strong, tendinous expansion, which arises from the projecting extremity of the os calcis, and passes to the root of the toes, covering and supporting the muscles of the sole of the foot. Where it arises from the heel, it is thick, but narrow; as it runs over the foot, it becomes broader and thinner; and it is fixed to the the head of each of the metatarsal bones by a bifurcated extremity, which by its splitting, leaves room for the tendons, &c. to pass. It seems divided into three portions, which are connected by strong fasiculi of tendinous fibres; and fibres are sent down, forming perpendicular partitions among the muscles, and separating them into three classes;

1. The middle portion, which is the largest, and under which are contained the flexor brevis digitorum, and the tendons of the flexor longus and lumbricales.

2. The external lateral portion, which covers the muscles of the little toe.

3. The internal lateral portion concealing the muscles of the great toe.

On removing the plantar aponeurosis, the first order of muscles in the sole of the foot is exposed: it consists of three muscles.

Abductor Pollicis, situated on the side of the great toe.

Abductor Minimi Digiti, on the side of the little toe.

Flexor Brevis Digitorum Pedis, the mass in the middle, situated between the two abductors.

1. ABDUCTOR POLLICIS PEDIS—*Arises*, tendinous and fleshy, from the lower and inner part of the os calcis; from a ligament which extends from the os calcis to the os naviculare; from the inside of the os naviculare and cuneiforme internum; and from the fascia plantaris.

Inserted, tendinous, into the internal sesamoid bone, and base of the first phalanx of the great toe.

It moves the great toe from the rest.

2. ABDUCTOR MINIMI DIGITI PEDIS—*Arises*, tendinous and fleshy, from the outer side of the os calcis; and from a strong ligament, which passes from the os calcis to the metatarsal bone of the little toe; also from the fascia plantaris.

Inserted, tendinous, into the base of the metatarsal bone of the little toe, and into the outside of the base of the first phalanx.

This muscle can frequently be divided distinctly into two portions.

It moves the little toe from the rest.

3. FLEXOR BREVIS DIGITORUM PEDIS PERFORA-TUS—*Arises*, fleshy, from the anterior and inferior part

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of the protuberance of the os calcis, and from the inner surface of the fascia plantaris; also from the tendinous partitions betwixt it and the abductors of the great and little toe:—it forms a thick fleshy belly, and sends off four tendons, which split for the passage of the tendons of the flexor longus digitorum, and are

Inserted into the second phalanx of the four lesser toes.

The tendon of the little toe is often wanting.

Its use is to bend the second joint of the toes.

The muscles of this order are quite superficial, being only covered by the fascia plantaris.

These being removed, or lifted from their origins, and left hanging by their tendons, the second order is exposed.

1. The tendon of the Flexor longus digitorum pedis is seen coming from the inside of the os calcis; and, having reached the middle of the foot, dividing into its four tendons, which pass through the slits of the tendons of the flexor digitorum brevis, and are inserted into the base of the last phalanx of the four toes.

2. The tendon of the Flexor longus pollicis is seen crossing under* the tendon of the flexor longus digitorum, and, having given to it a short slip of tendon, proceeding between the two sesamoid bones to the base of the last phalanx of the great toe.

3. FLEXOR DIGITORUM ACCESSORIUS, or Massa Carnea JACOBI SYLVII—*Arises*, fleshy, from the sinuosity at the inside of the os calcis, and, tendinous, from that bone more outwardly:—it forms a belly of a square form.

Inserted into the outside of the tendon of the flexor digitorum longus, just at its division.

It assists the flexor longus.

* In the erect posture, it crosses above, lying nearer to the metatarsal bones than that tendon; but in the description, the sole of the foot is supposed to be placed uppermost.

4. LUMBRICALES PEDIS—*Arise*, by four tendinous and fleshy beginnings, from the tendons of the flexor longus digitorum, immediately after their division.

Inserted, by four slender tendons, into the inside of the first phalanx of the four small toes, and into the tendinous expansion that is sent from the extensors to cover the upper part of the toes.

They serve to promote the flexion of the toes, and to draw them inwards.

The second order of muscles being removed, we expose the third order.

1. FLEXOR BREVIS POLLICIS PEDIS.—It arises, tendinous, from the under and fore part of the os calcis, where it joins with the os cuboides: also from the os cuneiforme externum; it forms a fleshy belly, which is connected inseparably to the abductor and adductor pollicis.

Inserted, by two tendons, into the external and internal sesamoid bones; and it is continued on into the base of the first phalanx of the great toe. It bends the first joint of the great toe.

2. ADDUCTOR POLLICIS PEDIS—*Arises*, tendinous and fleshy, from a strong ligament which extends from the os calcis to the os cuboides, and from the roots of the second, third, and fourth metatarsal bones; it forms a fleshy belly, which seems at its beginning divided into two portions.

Inserted, tendinous, into the external sesamoid bone, and root of the matatarsal bone of the great toe. Used to bring this toe nearer the rest.

3. FLEXOR BREVIS MINIMI DIGITI PEDIS—*Arises*, tendinous and fleshy, from the os cuboides, and from the root of the metatarsal bone of the little toe.

Inserted, tendinous, into the base of the first phalanx of the little toe, and into the anterior extremity of the metatarsal bone. Used to bend this toe.

TRANSVERSALIS PEDIS—*Arises*, tendinous, from

the anterior extremity of the metatarsal bone sup-
porting the little toe; becoming fleshy, it crosses over
the anterior extremities of the other metatarsal bones.

Inserted, tendinous, into the anterior extremity of
the metatarsal bone of the great toe, and into the
internal sesamoid bone, adhering to the adductor
pollicis.

It contracts the foot, by approximating the toes.

Ranging with this order of muscles, we may also
observe a broad, strong ligament, passing from the
anterior sinuosity of the os calcis over the surface of
the os cuboides, and the tendon of the tibialis pos-
ticus, dividing into numerous tendinous slips, to be
inserted into the bones of the tarsus.

Having removed the muscles last described, we
expose the fourth and last order.

The tendon of the peroneus longus is seen passing
along a groove in the os cuboides, and crossing the
tarsal bones, to be inserted into the base of the meta-
tarsal bone of the great toe, and into the internal
cuneiform and second metatarsal bones.

INTEROSSEI PEDIS INTERNI, are three in number,
situated in the sole of the foot. They *arise*, tendi-
nous and fleshy, from between the metatarsal bones
of the four small toes, and are

Inserted, tendinous, into the inside of the base of
the first phalanx of each of the three small toes.

Used to move the three smaller toes inwards
towards the great toe.

INTEROSSEI PEDIS EXTERNI, are four in number,
larger than the internal interossei, and situated on the
back of the foot; they are bicipites, or arise by two
slips.

Arise, tendinous and fleshy, between the metatarsal
bones of all the toes.

Inserted, the first, abductor indicis pedis, into the
inside of the base of the first phalanx of the fore-toe;

the second, adductor indicis pedis, into the outside of
the same toe;—the third, adductor medii digiti pedis,
into the outside of the middle toe;—the fourth, adduc-
tor tertii digiti pedis, into the outside of the third toe.

Used to separate the toes.

CHAPTER VI.

DISSECTION OF THE UPPER PART OF THE BODY.

SECTION I.

THE EXTERNAL PARTS OF THE HEAD.

THE integuments of the head are thick, and covered
with hair, having beneath the cutis a condensed cel-
lular substance, which is closely connected with the
epicranium, or expanded tendon of the occipito-fronta-
lis, and renders the dissection of that muscle difficult.

The only muscle, which properly belongs to the
hairy scalp, is a single broad digastric muscle, viz:

OCCIPITO-FRONTALIS. It arises fleshy and tendinous,
from the transverse ridge of the occipital bone, as far
forward as the mastoid process; forming a broad thin
tendon, which covers the whole upper part of the
cranium; it is

Inserted, fleshy, on each side, into the orbicularis
palpebrarum, the skin of the eye-brows, and the
internal angular process of the os frontis and os nasi.

The tendon of this muscle adhering firmly to the
skin, and but loosely to the pericranium, enables it to

raise the eye-brows, and corrugate the skin of the forehead.

The muscles of the external ear are not always so distinct as to admit of a clear demonstration.

(1) ATTOLLENS AUREM, or the Superior auris—*Arises* from the tendon of the occipito-frontalis, and from the aponeurosis of the temporal muscle.

Inserted into the upper part of the root of the cartilage of the ear, opposite to the antihelix.

Used to draw the ear upwards.

(2.) ANTERIOR AURIS—*Arises*, thin and membranous, from the posterior part of the zygomatic process of the temporal bone.

Inserted into a small eminence on the back of the helix, opposite to the concha.

Use: To draw the eminence a little forwards and upwards.

(3.) The RETRAHENTES AURIS, or Posterior auris—*Arises* by two or three distinct slips, from the external and posterior part of the mastoid process, immediately above the insertion of the sterno-cleido mastoideus.

Inserted into that back part of the ear which is opposite to the septum, dividing the scapha and concha.

Use: To draw the ear back, and stretch the concha.

The proper muscles of the ear are next to be described; but the student must not expect to meet with them distinctly marked in every subject; in general they are very confused and indistinct.

(1.) HELICIS MAJOR—*Arises* from the upper and acute part of the helix, anteriorly.

Inserted into its cartilage, a little above the tragus.

Use: To depress the part from which it arises.

(2.) HELICIS MINOR—*Arises* from the inferior and anterior part of the helix.

Inserted into the crus of the helix, near the fissure in the cartilage opposite to the concha.

Use: To contract the fissure.

(3.) TRAGICUS—*Arises* from the middle and outer part of the concha, at the root of the tragus, along which it runs.

Inserted into the point of the tragus.

Use: To pull the point of the tragus a little forwards.

(4.) ANTITRAGICUS—*Arises* from the internal part of the cartilage that supports the antitragus; and, running upwards, is

Inserted into the tip of the antitragus as far as the inferior part of the antihelix.

Use: To turn the tip of the antitragus a little outwards, and depress the extremity of the antihelix towards it.

(5.) TRANSVERSUS AURIS—*Arises* from the prominent part of the concha on the dorsum of the ear.

Inserted opposite to the outer side of the antihelix.

Use: It draws the parts to which it is connected towards each other, and stretches the scapha and concha.

The muscles of the internal ear are situated within the temporal bone itself; they are very small, and can be seen only when the internal parts of the organ of hearing are prepared; but their description is necessary to complete the history of the muscles.

(1.) LAXATOR TYMPANI—*Arises*, by a small origin, from the spinous process of the sphenoid bone, and the side of the Eustachian tube. It runs backwards, and a little upwards, along with the nerve called Chorda Tympani, in a fissure of the glenoid or articular cavity of the os temporis.

Inserted into the long process of the malleus.

Use: To draw the malleus obliquely forwards towards its origin, and consequently the membrana

tympani by which that membrane is made less con-
cave, or is relaxed.

(2.) TENSOR TYMPANI—*Arises*, by a small fleshy
beginning, from the cartilaginous extremity of the
Eustachian tube, just where it begins to be covered
by the pars petrosa and spinous process of the sphe-
noid bone, and runs along the bony half-canal of the
typanum, where it is invested by a membranous
vagina.

Inserted into the neck of the malleus, above the
small process, and even as far as the handle.

Use: To draw the malleus and membrana tympani
towards the pars petrosa, and thus render the mem-
brane more concave and tense.

A third, but much less distinct muscle, has been
described, under the name of EXTERNAL or SUPERIOR
MUSCLE of the malleus.

It arises from the internal, superior, and posterior
part of the meatus externus, to be fixed by a small
tendon to the neck of the malleus.

3. STAPEDIUS is a short and thick muscle. It
arises from, and lies concealed within, the small bony
pyramid at the bottom of the tympanum; the cavity
which it fills is near the bony canal for the portio
dura of the auditory nerve. It terminates in a small
tendon, which passing out of the cavity through the
small hole in the apex of the pyramid, runs forwards,
and is

Inserted into the neck of the stapes, on the sides of
the longest and most crooked leg of that bone.

Use: To draw the stapes obliquely upwards to-
wards the pyramid, by which the posterior part of
its base is moved inwards, and the anterior part
outwards.

SECTION II.

OF THE CONTENTS OF THE CRANIUM, OR THE BRAIN AND ITS MEMBRANES.

A transverse incision, extending from ear to ear over the crown of the head, being made through the tendon of the occipito-frontalis, the two flaps may, with facility, be inverted on the face and neck. Remove the superior part of the cranium by a saw directed anteriorly through the frontal bone above the orbitar process, and posteriorly as low as the transverse ridge of the occipital bone.

When the superior part of the cranium, commonly called the Calvarium, or skull-cap, has been torn off, for which considerable force is requisite, you expose the Dura Mater, a firm, compact, and whitish membrane, somewhat shining, rough on its outer surface, from the rupture of vessels which connected it to the cranium, and covered with bloody spots in consequence of the blood effused from these ruptured orifices. It is described as being separable into many laminæ; two, however, with facility, may be demonstrated; and it is said that these two laminæ, by separating and re-uniting, form the triangular cavities, named Sinuses, which are, in fact, large veins. This division of layers can hardly be admitted as correct in the recent state of the membrane.

The Superior Longitudinal Sinus lies in a groove formed by the two parietal bones; it extends along the sagittal suture from the crista galli of the ethmoid bone to the middle of the os occipitis, where it bifurcates into the two lateral sinuses; in its passage backwards, its size is increased. When slit open, its triangular form is evident; it is lined by a smooth membrane, and in it may be remarked the numerous

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openings of the veins of the pia mater, the frena, or slips of fibres crossing from side to side, the glandulæ Pacchioni internæ et externæ, which are little bodies like millet-seed, seen on the outer and inner surface of the sinus.

The arteries of the dura mater are divided into the anterior, middle, and posterior.

1. ARTERIA MENINGEA MEDIA (called also the Spinalis or Spheno-spinalis) the great middle artery, is a branch of the internal maxillary; it passes through the spinous hole of the sphenoid bone, and is seen rising from the anterior inferior angle of the parietal bone (in a groove of which it lies,) and spreading its numerous branches over the dura mater.

The anterior and posterior arteries are small.

2. A. MENINGEA ANTERIOR is sent off from the external carotid, and enters the cranium by the foramen lacerum orbitale superius.

3. A. MENINGEA POSTERIOR is given off by the vertebral artery; the dura mater also receives small twigs from the occipital, pharyngeal arteries, &c.

The nerves of the dura mater are said to come from the fifth pair; if they exist at all, they are small, and seldom demonstrated.

OF THE SEPTA OF THE BRAIN, OR PROCESSES OF THE DURA MATER.*

1. The FALX (septum sagittale, verticale, mediastinum cerebri or falciform process) is a long, broad fold, or duplicature of the inner lamina of the dura mater, dividing the cerebrum into two hemispheres, extending from the crista galli of the ethmoid bone, along the

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* To demonstrate these, the dura mater should be divided in the line of the division of the cranium: its internal surface will be found smooth, glistening, and free from adhesion, except in the course of the longitudinal sinus, into which veins pass from the pia mater.

middle of the os frontis and point of junction of the two
parietal bones,to the crucial ridge of the occipital bone,
where it terminates in the middle of the next septum.

2. The TENTORIUM CEREBELLI, or transverse sep-
tum. This separates the cerebrum from the cerebel-
lum, and is formed by the inner lamina of the dura ma-
ter, reflected off from the os occipitis along the groove
of the lateral sinuses, and the edge or angle of the tem-
poral bones. It is frequently called Tentorium Cere-
bello Super Extensum. Its position is horizontal.

There are some other folds of the dura mater, not
visible in this stage of the dissection, viz:

3. The falx of the cerebellum, or small occipital sep-
tum, which will be seen when the cerebrum is removed.
It extends from the middle of the tentorium along the
middle spine of the os occipitis to the foramen magnum,
dividing the cerebellum into two parts.

4. The sphenoidal folds, two small folds of the dura
mater, one on each side of the sella turcica, stretching
from the posterior to the anterior clinoid processes.

The dura mater also, in many parts of the brain,
separates its laminæ to form sinuses; the principal of
these will be noticed in the course of the dissection.

Detach the falx from the crista galli, and turn it back-
wards; observe in its lower edge the INFERIOR LON-
GITUDINAL SINUS, which enters a sinus in the Tento-
rium, termed Torcular Hierophili, or straight sinus.
This will fully expose the convolutions of the brain,
which are closely invested by the pia mater.

The next membrane which we meet is the TUNICA
ARACHNOIDES. It is a transparent membrane, cover-
ing uniformly the surface of the pia mater, without
passing into the interstices of its duplicatures. It is
attached to it, is extremely thin, without vessels, de-
monstrated with difficulty on the upper surface of the
brain by the blow-pipe (which raises it into cells,) but
on the base of the brain it can be distinctly seen.

Beneath the last membrane is found the Pia Mater, or tunica vasculosa, a very vascular membrane, transparent in the interstices of its vessels, investing the substance of the brain, descending betwixt all its convolutions, and lining its different cavities; but, where it lines the ventricles it is fine, delicate, and less vascular, than on the surface, and betwixt the convolutions of the brain: It is connected to the dura mater by its veins passing into the longitudinal sinus.

The brain is divided into three parts: The cerebrum; the cerebellum; and the medulla oblongata.

The CEREBRUM consists of two distinct substances:

1. The cineritious or cortical substance forming the outer part.

2. The white or medullary substance forming the inner part.

The brain is divided by the falx into two hemispheres, and by the pia mater into numerous convolutions.

Each hemisphere is divided into three lobes.

The ANTERIOR LOBES rest on that part of the cranium which forms the two orbits, and is called the anterior fossæ of the basis of the cranium.

The MIDDLE LOBES are situated before and above the medulla oblongata, and rest on the middle fossæ of the basis cranii, which are formed by the sphenoid and temporal bones.

The POSTERIOR LOBES are supported by the tentorium.

The anterior and middle lobes are parted by a deep narrow sulcus, which ascends obliquely backwards from the temporal ala of the os sphenoides to near the middle of the os parietale; it is termed FISSURA CEREBRI, or Fissura Magna Silvii.

By gently separating with the fingers the two hemispheres of the brain,* we see passing betwixt them a

* Between the hemispheres and on the surface of the corpus callosum, we observe, if the arteries are injected, the arteriæ callosæ, which are the continuation of the trunks of the anterior cerebri.

longitudinal white convex body, the CORPUS CALLO-
SUM; it lies under the falx, incurvates downwards at
both its extremities, and is continued anteriorly into the
medullary substance betwixt the corpora striata, pos-
teriorly into the fornix and inferior cornu of the lateral
ventricle on each side. From its connecting the two
hemispheres it is called the Commissura Magna. On
the surface of the corpus callosum is seen the RAPHE,
formed by two longitudinal medullary lines united by
transverse fibres.

When the brain is cut horizontally on a level with
the corpus callosum, an appearance is produced,
termed the Medullary arch, or CENTRUM OVALE.
When only one of the hemispheres is sliced off to this
level, the appearance presented by the medullary
substance is called the *centrum ovale parvum* of Vicq
d'Azyr.

Under this arch are the two lateral ventricles.* If
one of these be cautiously perforated on the side of
the corpus callosum, and gently inflated by a blow-
pipe, its extent may be seen; but, if much force be
used, the air will pass into the other ventricle.

The two ventricles are separated by a medullary
partition, which descends from the inferior surface of
the corpus callosum to the fornix, and is called the
SEPTUM LUCIDUM; it consists of two laminæ, with a
narrow cavity between. To see this septum, one of
the ventricles must be laid open, and the septum pulled
gently to the other side.

The LATERAL VENTRICLES are two in number, the
right and the left, lined with a fine membrane, narrow,
consisting of a body, and three prolongations or cor-
nua.

* To show the lateral ventricles, the corpus callosum should be cut
away close to the septum lucidum; and then, the ventricle of that body,
and the thickness and breadth of the septum itself, will be more clearly
seen.

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1. The body is formed betwixt the corpus callosum, the medulla of the brain, the convexity of the corpus striatum, and the thalamus nervi optici.

2. The anterior cornu or horn is formed betwixt the more acute convexity of the corpus striatum, and the anterior part of the corpus callosum.

3. The posterior cornu (called also the digital cavity) may be traced stretching backwards and downwards into the posterior lobe of the brain.

4. The inferior or descending cornu cannot be traced in this stage of the dissection; it seems like the continued cavity of the ventricle, takes a curve backwards and outwards, and then, turning forwards, descends into the middle lobe of the brain.

The lateral ventricles communicate with each other, and with the third ventricle, by an opening under the fore part of the arch of the fornix, called the *foramen commune anterius.**

In the lateral ventricles we meet with

The Fornix, a medullary body, flat, and of a triangular shape; which divides the two lateral and the third ventricles. It is exposed on tearing away the septum lucidum; its lower surface is towards the third ventricle; its lateral margins are in the lateral ventricles; on its upper surface it supports the septum lucidum, and under its most anterior part is the foramen Monroianum:—One of the angles of this body is forward, and the other two towards the back part; it rests chiefly on the thalami nervorum opticorum, but

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* It has been doubted whether or not this be an opening; the choroid plexus passes through it, and seems to unite the surfaces: it is absurdly named the Foramen Monroianum, from a mistaken notion that Dr. Monro discovered it, and may be seen by gently turning the anterior crus of the fornix to one side; it is a space betwixt the most anterior part of the convexity of the thalami nervorum opticorum, and the anterior crus of the fornix.

This foramen may always be easily found by following the course of the plexus choroides, as it passes forwards in the ventricle. It is a slit, rather than a round hole, in the natural state.

is separated from them by a vascular membrane called the velum.

The extremities of the body of the fornix are named its Crura.

1. The crus anterius is double, bends downwards before the anterior commissure of the brain, with which it is connected, and may be traced into the corpora albicantia.

2. The two crura posteriora, coalescing with the back part of the corpus callosum, pass, on each side, into the inferior cornu of the lateral ventricle, and terminate in a pointed form on the hippocampus major.

Divide the body of the fornix, invert it, by turning the anterior crus forwards, and the posterior crura backwards; on the under surface of the latter is an appearance of transverse lines, named Corpus Psalloides, psalterium, or lyra.

The inversion of the fornix exposes

The PLEXUS CHOROIDES.—This is a continuation of the pia mater, a spongy mass, consisting of folds of tortuous vessels, partly covering the thalami nervorum opticorum, and continued into the inferior cornu of the lateral ventricles. The plexus of each side is connected to its fellow by the velum interpositum, a membrane which passes under the fornix, and lies on the third ventricle and corpora quadrigemina.

From this plexus the blood is received by the VENA GALENI, situated in the middle of the velum which consists of two parallel branches; these run backwards, unite, and enter the fourth sinus of the dura mater, called TORCULAR HIÉROPHILI.

This plexus should now be detached at its fore part, and turned back: it will remain as a guide to the knife in tracing the inferior cornu of the lateral ventricle.

We now see

The CORPORA STRIATA, two smooth cineritious convexities, in the fore part of the lateral ventricle,

broad, and rounded anteriorly, becoming narrow, and diverging as they pass backwards, consisting of medullary and cortical substance disposed in striæ.

The Thalami Nervorum Opticorum, two large oval, whitish eminences, placed by the side of each other between the diverging extremities or crura of the corpora striata; towards their fore part is a peculiar eminence or convexity, called the Anterior Tubercle or *Monticulus;* they are elongated downwards, to form the optic nerves.

The Tænia Semicircularis, is a white medullary line, running in the angle betwixt the corpus striatum and thalamus nervi optici of each side.

The Commissura Anterior Cerebri, is a short cylindrical medullary cord, stretched transversely between the fore and lower part of the corpora striata, immediately under the anterior crura of the fornix.

Just above the commissura anterior, and before the thalami, is the Vulva, or foramen commune anterius, a small slit or indentation, formed by the anterior crus of the fornix, bifurcating, and inserting itself, on each side, between the corpus striatum and thalamus nervi optici. This slit is the space by which the three ventricles communicate.

The Commissura Mollis is an exceedingly soft, broad, cineritious junction betwixt the convex surfaces of the thalami nervorum opticorum.

On separating the optic thalami, we discover the Third Ventricle. This is a longitudinal sulcus, or slit, situated betwixt the thalami nervorum opticorum, and betwixt the crura cerebri. Above, it is covered by the fornix and velum interpositum; at its upper and fore part, it communicates with the two lateral ventricles; below the commissura anterior, it opens into the infundibulum. This opening is termed iter ad infundibulum. Backwards, it is continued by a canal which passes under the tubercula quadrigemina into

the fourth ventricle. This passage is named iter ad quartum ventriculum, aquæductus Sylvii, or canalis medius.

The ANUS, or foramen commune posterius, is situated behind the commissure of the optic thalami, and before the corpora quadrigemina. It is closed up by the velum interpositum, and, when that is removed, leads into the back part of the third ventricle.

The PINEAL GLAND, a small, soft, greyish, and conical body, of the size of a pea, is seated above the tubercula quadrigemina, and behind the thalami, to which it is connected by two white pedunculi, or foot-stalks; its base is turned forwards, and the apex backwards; it is covered by the plexus choroides and posterior crura of the fornix. It contains an earthy matter, either in its own substance, or that of the pedunculi, resembling sand, and, when viewed by a magnifier, assuming a granulated and clear light yellow appearance. It was named by Sœmmerring, who first discovered that it belongs to the healthy structure of the brain, the ACERVULUS GLANDULÆ PINEALIS.

The COMMISSURA POSTERIOR is a transverse cord at the back part of the third ventricle, before the tubercula quadrigemina, and above the iter ad quartum ventriculum.

TUBERCULA QUADRIGEMINA, four small white bodies, adhering together, lying under the pineal gland, behind the third ventricle, and above the fourth. The uppermost two are named NATES, and the other two TESTES.

From the under part of the testes, there projects backwards, connecting itself with the crura cerebelli, a thin medullary lamina, which is the valvula Vieussenii, called also processus a cerebello ad testes, velum interjectum, valvula major.

The inferior cornu of the lateral ventricle, which descends into the middle lobe of the brain, may now be

traced, by following the tract of the choroid plexus;* in it is seen

The HIPPOCAMPUS MAJOR, or Cornu Ammonis. At its commencement it is narrow, but it becomes a broad medullary projection of the floor of the ventricle, and its extremity, which is called PES HIPPOCAMPI, is curved inwards. The thin edge on its inside, which follows the whole of its circuit, is named the CORPUS FIMBRIATUM, or Tænia Hippocampi. The posterior crus of the fornix runs along its inner and anterior part, in the form of a thin floating edge.

In the posterior cornu of the lateral ventricle, which passes into the posterior lobe of the brain, there is a similar medullary projection, but smaller, the HIPPO-CAMPUS MINOR.

In the anterior part of the third ventricle, below the iter ad infundibulum, are seen the CORPORA ALBI-CANTIA Willisii (corpora mamillaria or subrotunda,) two medullary eminences of the size of peas; the remainder of these bodies is seen on the outer surface of the base of the brain.

This completes the demonstration of the cerebrum. The whole of the posterior lobes, and the lateral part of the middle lobes, may be removed. This exposes to your view,

The TENTORIUM, and the FALX CEREBELLI. At this point you should trace the bifurcation of the longitudinal sinus into the two lateral sinuses. The lateral sinuses are formed by the splitting of the laminæ of the tentorium; hence they follow the course of that membrane, run along their grooves in the occipital bone, and dip downwards and forwards through the foramen lacerum in basi cranii, to terminate in the internal jugular veins.

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* Or it may be exhibited by cutting away successive slices of the side of the brain, until the ventricle is exposed.

The TORCULAR HIEROPHILI, or fourth sinus, runs along the middle of the tentorium, and joins the extremity of the longitudinal sinus at the point where it bifurcates.

The great notch of the tentorium is a circular opening left on the anterior part of the tentorium, allowing a junction between the cerebrum and cerebellum.

Proceed next to the examination of the cerebellum; and, in order to accomplish this demonstration, it will be convenient to remove the posterior part of the os occipitis.

CEREBELLUM.—This part of the brain, divided into two lobes by the falx cerebelli, or septum occipitale, is covered by a vascular membrane; consists of medullary and cineritious substance; but instead of convolutions, has numerous deep sulci, into which the pia mater dips, and forms thin flat strata.

Remark the following processes:

1. Appendix, vel processus vermiformis superior, situated under the pia mater, on the anterior and superior part of the cerebellum.

2. Appendix, or processus vermiformis posterior, will be found situated between the two lobes on the under surface of the cerebellum, and immediately behind the medulla oblongata.

On separating the two lobes behind, and making a deep incision, we discover

The FOURTH VENTRICLE.—The sides of this ventricle are formed by the cerebellum, the anterior part by the medulla oblongata, the upper and back part by the valvula cerebri; it is lined by a thin vascular membrane, and has on its fore part a groove or fissure, which, terminating in a sharp point, is named CALAMUS SCRIPTORIUS. On each side of this groove are seen several medullary lines, which are the origin of the portio mollis of the seventh pair of nerves. The iter a tertio ad

quartum ventriculum enters the upper part of the fourth ventricle.   The valvula cerebri hangs over it.

On cutting the cerebellum perpendicularly, there is formed, from the intermixture of cineritious and medullary matter, a tree-like appearance, named ARBOR VITÆ, of which the trunk is termed the peduncle of the cerebellum, and is continued to the back part of the medulla oblongata.   This concludes the demonstration of the cerebellum.

To demonstrate the medulla oblongata and nerves, either the brain must be removed from the cranium, or it may be gradually inverted in the progress of the demonstration;—and this is the better method.   The inversion must be begun at the fore-part, by raising the anterior lobes of the cerebrum.   Thus you will see,

1. The FIRST PAIR OF NERVES, the OLFACTORY, called also Processus Mammillares.   They arise from the outside of the corpora striata, between the anterior and middle lobe of the brain; run under the anterior lobes; being lodged on two superficial grooves, and lying between the pia and dura mater; expand into a small oval ganglion, from which several small filaments descend through the cribriform plate of the ethmoid bone, to ramify on the membrane lining the nose.

2. The SECOND PAIR, the OPTIC, arise from the posterior part of the optic thalami, and also from the tubercula quadrigemina; they make a circle round the crura cerebri called the TRACTUS OPTICUS.   The two nerves approach gradually, and unite, just before the pituitary gland, on the fore part of the sella Turcica. They then diverge, and each nerve passes out at the foramen opticum of the sphenoid bone, to form the retina of the eye.

On each side of these nerves are seen the CAROTID ARTERIES.   Each artery emerges from the cavernous sinus by the side of the anterior clinoid process: sends

a branch forwards, which, uniting with a similar branch of the other carotid, forms the anterior part of the CIR-CULUS ARTERIOSUS Willisii; while other branches, passing backwards, and uniting with branches of the basilar artery, complete the posterior part of the arterial circle.

A fold of dura mater passes from the anterior to the posterior clinoid process of each side. This fold is double, and forms by its duplicature the CAVERNOUS SINUS.

On dividing the optic nerves, and inverting them, we see the infundibulum, a funnel of cineritious substance, leading from the inferior and anterior extremity of the third ventricle to the pituitary gland; it is generally imperforate before it reaches the gland.

The PITUITARY GLAND, a reddish body, somewhat globular, consisting of two lobes, is situated in the sella Turcica of the sphenoid bone, partly covered by a fold of dura mater, and attached to the infundibulum. The circular sinus is situated at this point.

On detaching the cerebrum from the back part of the sella Turcica, the tunica arachnoides is very evident.

3. The THIRD PAIR OF NERVES, MOTORES OCU-LORUM, arise from the crura cerebri*, pass outwards and forwards on the outer side of the posterior clinoid process into the cavernous sinus, and run through the foramen lacerum orbitale superius to the muscles of the eye.

Between these two nerves are seen the two vertebral arteries, ascending and uniting, to form the basilary artery.

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* The two crura pass obliquely backwards and inwards, so as to converge and meet in front of the tuber annulare; it is from the hollow formed by their convergence, and named by Vicq d'Azyr, *fosse des nerfs occulo-musculaires*, that the third pair arise.

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4. The FOURTH PAIR, TROCHLEARES or PATHET-
ICI, are very slender, and situated immediately under
the edge of the tentorium. This nerve arises from
the valvula cerebri, comes out from betwixt the cere-
brum and cerebellum, passes by the side of the pons
Varolii, and, passing through the cavernous sinus,
continues its course through the foramen lacerum
orbitale superius, to supply the obliquus superior
muscle of the eye.

5. The FIFTH PAIR, TRIGEMINI, are much larger
than the fourth, and are situated more outwards and
backwards. Each of these nerves arises, by a num-
ber of filaments, from the anterior and lowest part of
the crus cerebelli, where the crus unites with the
pons Varolii;—it passes forwards, enters the cavern-
ous sinus, where it untwists itself, and forms a flat
irregular ganglion, the GANGLION GASSERIANUM, and
then divides into three great branches.

(1.) RAMUS OCULARIS.—The ophthalmic nerve of
Willis passes through the foramen lacerum orbitale
superius to the appendages of the eye.

(2.) RAMUS MAXILLARIS SUPERIOR passes through
the foramen rotundum to the upper jaw and face.

(3.) RAMUS MAXILLARIS INFERIOR passes through
the foramen ovale to the lower jaw and tongue.

6. The SIXTH PAIR, MOTORES OCULORUM EX-
TERNI, or abductores vel abducentes.—This nerve is
small, but not so small as the fourth pair; it is seen
arising betwixt the pons Varolii and corpora pyrami-
dalia: it enters the cavernous sinus,—it there runs by
the side of the carotid artery, and passes through the
foramen lacerum orbitale superius to the rectus exter-
nus oculi.

While in the cavernous sinus, it gives off the small
twig, which, uniting with filaments from the second
branch of the fifth pair, forms the beginning of the

intercostal nerve, and passes out of the cranium through the foramen caroticum with the carotid artery.

7. The SEVENTH PAIR, NERVI AUDITORII, consists of two portions.

(1.) The Portio Dura, or the fascial nerve, arises from the crus cerebelli, and comes out from the fossa or groove betwixt the pons Varolii, corpora olivaria, and crura cerebelli.

(2.) The Portio Mollis, or more properly the auditory nerve, arises from the inner surface of the fourth ventricle; it has a groove on its surface for receiving the portio dura;—accompanied by an artery, they enter the meatus auditorius internus, where the portio mollis is distributed to the parts of the internal ear, while the portio dura runs through the aqueduct of Fallopius, and comes out at the stylo-mastoid foramen below the ear, to form the principal nerve of the face.

8. The EIGHTH PAIR, PAR VAGUM, arises by numerous filaments from the sides of the corpora olivaria and medulla oblongata. Two distinct fasciculi are formed, the uppermost called nervus glosso-pharyngeus, the other the proper par vagum;—they unite, run towards the foramen lacerum in basi cranii, pierce the dura mater, and pass out through the anterior part of that hole, having been first joined by the

NERVUS ACCESSORIUS AD PAR VAGUM, or spinal accessory, which runs up from the medulla spinalis through the great occipital foramen.

The great LATERAL SINUS passes out by the back-part of the same foramen, to form the internal jugular vein; it is separated from the nerve by a slip of cartilage.

9. The NINTH PAIR, LINGUALES, Linguales Medii, Hypoglossi.—This nerve arises from the furrow betwixt the corpora olivaria and pyramidalia, by several filaments which often pierce the dura mater separately. It passes through the anterior condyloid

hole of the occipital bone, to supply the muscles of the tongue.

Immediately after leaving the cranium, the eighth and ninth pair, and the ganglion of the intercostal, are connected together.

10. The TENTH PAIR,* SUBOCCIPITALES, arise, on each side, by two bundles, from the extremity of the medulla oblongata, and upper part of the spinal marrow, pass through the dura mater by the same foramen which gives entrance to the vertebral artery, and run through the foramen magnum occipitale to the muscles at the base of the cranium.

The corpora albicantia Willisii, are again seen, two white bodies, on the base of the brain, behind the infundibulum, and above the pons Varolii.

The MEDULLA OBLONGATA remains to be demonstrated. It should be removed from the bone, and examined in an inverted position. On its under surface are seen the two vertebral arteries, ascending from the foramen magnum, and uniting, to form one trunk, the basilar artery.

On removing the pia mater, the whole surface appears medullary; but an incision shows it to be intermixed with the cineritious substance.

The CRURA or PEDUNCULI CEREBRI are two considerable medullary fasciculi, proceeding from the centre of the medulla of the brain, more immediately from the corpora striata; they unite at an acute angle, and are united to the pons Varolii.†

The CRURA or PEDUNCULI CEREBELLI are very large, and pass from the medullary part of the cerebellum which forms the arbor vitæ to the pons Varolii.

* These are now perhaps as frequently described as the first pair of cervical nerves.

† On making a section of the crura cerebri, near to their union with the pons Varolii, a portion of a dark-brown colour, surrounded with white medullary substance, is seen, termed Locus Niger Crurum Cerebri.

The PONS VAROLII, Tuber Annulare, or Nodus Cerebri, is a medullary protuberance, formed by the union of the crura cerebri and cerebelli, over which it is stretched like a bridge; on its surface is a raphe, or transverse fibres passing into a middle longitudinal narrow depression.

Below the pons Varolii, and separated from it by a sulcus, are seen four eminences:

1. The two external are named CORPORA OLIVARIA.

2. The two internal are named CORPORA PYRAMIDALIA, and, by separating these two bodies, medullary cords, passing transversely, appear, the nervi intercerebrales.

Small cords also project from the back part of the corpora olivaria, which have received the name of *Corpora Restiformia.*

The point of union betwixt the corpora pyramidalia and pons Varolii, is sometimes called foramen cæcum.

The medulla oblongata now contracts itself, and passing through the foramen magnum occipitale, assumes the name of

MEDULLA SPINALIS, or the Spinal Marrow. This part of the nervous or sensorial system must be here described, although its dissection cannot be performed till all the muscles of the back are removed, so that the posterior part of the spinal canal may be sawed off.

The spinal canal is lined by a strong ligamentous sheath, and the dura mater is continued down upon this sheath in the form of a funnel.

The spinal marrow consists externally of medullary substance, internally of cineritious. It runs down to the first lumbar vertebra, where it terminates by numerous filaments, which form the cauda equina. It is closely embraced by the pia mater, while the tunica arachnoides adheres to that membrane very loosely.

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During the whole of its passage, there is on each side a membranous connection betwixt the pia and dura mater, by distinct slips, irregular and pointed, which connection is named LIGAMENTUM DENTICULATUM. The arteries of the medulla may be seen running down on its anterior and posterior surfaces; they are branches of the vertebral artery.

The spinal accessory nerve is seen arising by small twigs from the posterior bundles of the fourth, fifth, sixth, and seventh cervical nerves; it then ascends along the spinal canal, enters the foramen, and passes forwards, to accompany the par vagum.

The spinal marrow sends off twenty-nine pair of spinal nerves, which pass through the foramina formed betwixt the bodies of the vertebræ. They consist of seven cervical, twelve dorsal, five lumbar, and five sacral pairs of nerves. Each of these nerves arises in two fasciculi, one from the fore part, the other from the back part of the spinal marrow; these fasciculi penetrate the dura mater separately; the posterior bundle forms a ganglion, and afterwards unites with the anterior fasciculus, to form the nerve.

CHAPTER VII.

DISSECTION OF THE ANTERIOR PART OF THE NECK.

THE utility of this dissection must be evident, when you consider how many important parts are contained in the fore part of the neck. The tube which conveys air to the lungs, the vessels which are sent from the heart to the brain, and the nerves which are destined to supply the thoracic and abdominal viscera, are here situated, and all these parts lie imbedded in cellular substance; hence the dissection is intricate, and requires the utmost care in its performance.

The muscles of the anterior part of the neck, are sixteen in number on each side. They may be divided into muscles situated superficially, muscles at the upper part of the neck, and those situated at the lower part.

The superficial muscles are two: to display them, make an incision from the chin to the sternum, another along the clavicle, and a third along the edge of the inferior maxillary bone; dissect up the flap and you will expose immediately under the integuments, and adhering to them,

1. The MUSCULUS CUTANEUS, vulgo, Platysma myoides, or Latissimus Colli.—It *arises*, by slender separate fleshy fibres, from the cellular substance, covering the upper part of the deltoid and pectoral muscles. These fibres form a thin broad muscle, which runs obliquely upwards, and is

Inserted into the skin and muscles covering the lower jaw and cheek.

Use: To draw the skin of the cheek downwards, and, when the mouth is shut, to draw the skin under the lower jaw upwards: others say that it assists the respiration and circulation.

Remove the platysma myoides from its origin, and invert it over the face. Immediately beneath it is seen the external jugular vein, which is formed of branches from the temple, side of the face, and throat. It crosses obliquely over the sterno-mastoideus, passes behind the outer edge of that muscle, and dives beneath the clavicle, to enter the subclavian vein.

2. The STERNO-CLEIDO-MASTOIDEUS—*Arises*, by two distinct origins; the anterior, tendinous and fleshy, and somewhat round, from the top of the sternum, near its junction with the clavicle; the posterior or outer, fleshy and flat, from the upper and anterior part of the clavicle. These two origins soon unite, and form a strong muscle, which ascends obliquely upwards and outwards, to be

Inserted, tendinous, into the outside of the mastoid process, and into the transverse ridge behind that process.

Use: When one acts singly, it turns the head to one side. When both act together, they bend the head forwards.

The muscle should be detached from the sternum and clavicle, and left suspended by its insertion. It is pierced by several branches of the cervical nerves, and about its middle, it is perforated by the Nervus Accessorius. These nerves ramify on the neighboring muscles of the neck and shoulder. Between the posterior edge of the sterno-cleido-mastoideus and the fore part of the trapezius muscles, is seen a quantity of loose fatty substance, intermixed with branches of nerves. This fatty substance is watery and granulated; it must not be removed roughly, lest important

nerves and vessels be injured; it is continued around the vessels under the clavicle.

In the middle of the throat may be seen:

The Os Hyoides, or bone of the tongue, forming the uppermost of the projections beneath the chin.

The Larynx, or upper part of the trachea, consisting of five cartilages, of which two are evident externally, viz: the uppermost and largest the thyroid cartilage; and the inferior or cricoid cartilage. The two arytenoid cartilages, and the epiglottis, lie behind this.

The Trachea, consisting of cartilaginous rings, and extending into the thorax.

Behind the larynx is situated the pharynx. At the part where the larynx terminates in the trachea, the pharynx contracts itself, and forms the œsophagus, or muscular tube, conveying the food to the stomach, which descends behind the trachea, situated rather to the left side of the cervical vertebræ.

These parts are covered by muscles, and on each side of the trachea lie the great vessels and nerves.

The muscles at the lower part of the neck are five.

3. The STERNO-HYOIDEUS—*Arises*, thin and fleshy, from the upper and inner part of the sternum, clavicle, and first rib:—It forms a flat narrow muscle.

Inserted into the base of the os hyoides.

This pair of muscles is seen on removing the platysma myoides, between the sterno-cleido mastoidei.

Use: To pull the os hyoides downwards.

4. The OMO-HYOIDEUS—*Arises*, broad, thin, and fleshy, from the root of the coracoid process, and semilunar notch of the scapula, ascends across the neck, and forms a middle tendon, where it passes below the sterno-cleido-mastoideus. Becoming fleshy again, it runs up, and is

Inserted into the base of the os hyoides, between its cornu and the insertion of the sterno-hyoideus.

The lower part of this muscle is covered by the trapezius; its middle by the sterno-cleido-mastoideus; its anterior part is seen on removing the platysma myoides; it crosses over the carotid artery, and internal jugular vein.   ⋅

Use: To assist in drawing down the os hyoides.

On dividing the sterno-hyoideus, observe under it,

5. The STERNO THYROIDEUS.—This muscle *arises,* fleshy, from the inside of the sternum, and of the extremity of the first rib; forms a flat muscle, and is

Inserted into the inferior edge of the thyroid cartilage.

Use: To draw the thyroid cartilage, and consequently the larynx, downwards.

Under the sterno-thyroideus, we find situated the

THYROID GLAND, a large reddish mass, situated on the superior rings of the trachea, below the cricoid cartilage; in form somewhat like a crescent, with the cornua turned upwards.

6. The THYRO-HYOIDEUS—*Arises,* fleshy, from the upper surface of the oblique ridge in the ala of the thyroid cartilage, and passes upwards, to be

Inserted into part of the base, and almost all the cornu of the os hyoides. It is covered by the sterno-hyoideus.

7. The CRICO-THYROIDEUS—*Arises,* tendinous and fleshy, from the side and fore part of the cricoid cartilage, and runs obliquely upwards.

Inserted, by two fleshy portions, the first into the lower part of the thyroid cartilage, and the second into its inferior cornu.

It is found on the side of the larynx, and under the sterno-thyroideus, and serves to pull forwards and depress the thyroid, or to elevate and draw backwards the cricoid cartilage.

The muscles at the upper part of the neck consist of nine pair.

8. The DIGASTRICUS—*Arises*, from the fossa at the root of the mastoid process of the temporal bone; its fleshy belly terminates in a strong round tendon, which runs downwards and forwards, passes through the fleshy belly of the stylo-hyoideus, is fixed by strong ligamentous and tendinous fibres to the os hyoides, from which it receives an addition of fibres; it then becomes again fleshy, and runs obliquely upwards, to be

Inserted into a rough sinuosity on the lower jaw behind the Chin.

Its posterior belly is covered by the sterno-cleido-mastoideus; but its anterior lies immediately under the skin and platysma myoides.

Use: To open the mouth, by pulling the lower jaw downwards and backwards; and, when the jaws are shut, to raise the larynx, and consequently the pharynx, in deglutition.

In the triangular space formed by the two bellies of this muscle, and the base of the lower jaw, lies the SUBMAXILLARY GLAND. It rests upon a flat muscle, the mylo-hyoideus, which is seen between the two bellies of the digastricus; the gland is surrounded by little absorbent glands.

9. The STYLO-HYOIDEUS—*Arises*, tendinous, from the middle and inferior part of the styloid process of the temporal bone; its fleshy belly is generally perforated by the digastricus.

Inserted, tendinous, into the os hyoides at the juncture of its base and cornu.

The origin of this muscle is situated more inwards than the last, and nearer the base of the cranium; it is the most superficial of three muscles which arise from the styloid process; sometimes it is accompanied by

another small muscle, having the same origin and insertion, the stylo-hyoideus alter.

Use: To pull the os hyoides to one side, and a little upwards.

10. The STYLO-GLOSSUS—*Arises*, tendinous and fleshy, from the styloid process, and from a ligament that connects that process to the angle of the lower jaw. It descends, and becomes broader, but less thick.

Inserted into the root of the tongue, runs along its side, and is insensibly lost near its tip.

Use: To move the tongue laterally and backwards.

11. The STYLO-PHARYNGEUS—*Arises*, fleshy, from the root and inner part of the styloid process.

Inserted into the side of the pharynx and back part of the thyroid cartilage.

It is situated deeper, and behind the stylo-glossus, and serves to dilate and raise the pharynx and thyroid cartilage upwards.

On removing the submaxillary glands, and detaching the digastric muscle from the os hyoides and chin, we expose the next muscle.

12. The MYLO-HYOIDEUS—*Arises*, fleshy, from all the inside of the lower jaw, between the last dens molaris and the middle of the chin; the fibres form a flat muscle, converge, and are

Inserted into the lower edge of the base of the os hyoides; it unites with its fellow in a middle tendinous line which extends from the os hyoides to the chin; its posterior part is lined by the internal membrane of the mouth; it lies under the digastricus, but is seen betwixt its bellies.

Use: To pull the os hyoides forwards, upwards, and to either side.

The submaxillary gland sends off a duct, which passes behind the posterior edge of the mylo-hyoideus, then runs along the inner surface of this muscle for-

wards and upwards, on the inside of the sublingual gland to open into the mouth on the side of the frenum of the tongue.

The SUBLINGUAL GLAND lies immediately above the mylo-hyoideus, betwixt it and the internal membrane of the mouth, where it lines the side and inferior surface of the tongue. It sends off several ducts, which open into the mouth between the root of the tongue and side of the lower jaw.

The removal of the mylo-hyoideus exposes a pair of muscles, which are closely attached to one another.

13. The GENIO-HYOIDEUS—*Arises*, tendinous, from a projection on the inside of that part of the lower jaw which is called the Chin; it descends, becoming broader, and is

Inserted into the basis of the os hyoides.

Use: To draw the os hyoides forwards and upwards to the chin.

By removing this muscle, or turning it back from its origin from the jaw, we discover the next muscle.

14. The GENIO-HYO-GLOSSUS—*Arises*, tendinous, from a rough protuberance on the inside of the lower jaw, higher up than the origin of the genio-hyoideus; its fibres run forwards, upwards, and backwards, in a very wide and radiated manner, to be

Inserted, some into the posterior part of the base of the os hyoides, near its cornu, others into the tip, middle, and root of the tongue.

This muscle lies under the genio-hyoideus before; and more outwardly, under the mylo-hyoideus.

Use: According to the direction of its fibres, to draw the tip of the tongue backwards into the mouth, the middle downwards, and to render its dorsum concave; to draw its root and the os hyoides forwards, and to thrust the tongue out of the mouth.

It is called also Genio-glossus.

15. The HYO-GLOSSUS—*Arises*, broad and fleshy,

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from half of the base, and part of the cornu of the os hyoides; the fibres run upwards, to be

Inserted into the side of the tongue.

It is situated more outwardly than the genio-hyo-glossus, and, at its insertion into the tongue, mixes with the stylo-glossus.

It moves the tongue inwards and downwards.

16. The LINGUALIS—*Arises* from the root of the tongue laterally, and runs forwards between the hyo-glossus and genio-hyo-glossus, to be

Inserted into the tip of the tongue, along with part of the stylo-glossus.

Use: To contract the substance of the tongue, and bring it backwards.

CHAPTER VIII.

DISSECTION OF THE MUSCLES ON THE OUTSIDE OF THE THORAX.

In removing the integuments from the fore part of the thorax, the pectoralis major and interior edge of the deltoid muscle should be dissected in the course of their fibres; and to do this, it will be necessary to remember that the fibres run obliquely from the ster-num and clavicle to the upper part of the os humeri. They are not covered by any fascia, but by a con-densed cellular membrane.

Three pair of muscles are described in this dissec-tion.

1. The PECTORALIS MAJOR—*Arises*, tendinous, from the anterior surface of the sternum, its whole

length; fleshy, from the cartilages of the fifth, sixth, and sometimes the seventh ribs, and from two anterior thirds of the clavicle. The fleshy fibres run obliquely across the breast, and, converging, form a strong flat tendon, which is

Inserted into the outside of the bicipital groove of the os humeri.

The clavicular and thoracic portions of the muscle are separated by a line of cellular membrane. The tendon is covered by the anterior edge of the deltoid; it forms the anterior fold of the arm-pit, and appears twisted; for the fibres, which proceed from the thoracic portion of the muscle, seem to pass behind those proceeding from the clavicle, and to be inserted into the os humeri somewhat higher up.

Use: to move the arm forwards, and obliquely upwards, towards the sternum; or to draw it towards the side.

The pectoralis major should be lifted up from its origin, and suspended by its tendon. This will expose the next two muscles.

2. The PECTORALIS MINOR—*Arises*, by three tendinous and fleshy digitations, from the upper edges of the third, fourth, and fifth ribs, near their cartilages; it forms a fleshy triangular belly which becomes thicker and narrower as it ascends, and is

Inserted, by a short flat tendon, into the anterior part of the coracoid process of the scapula.

The belly of this muscle is covered by the pectoralis major; the tendon passes under the anterior edge of the deltoid, and is connected at its insertion with the origins of the coraco-brachialis, and of the short head of the biceps flexor cubiti, and also with the ligamentum proprium scapulæ anticum, a strong ligament, which passes from the external edge of the coracoid process, to be affixed to the posterior margin of the acromion of the scapula.

Use: To draw the scapula forwards and downwards, and, when that bone is fixed, to elevate the ribs.

This muscle is called also Serratus minor anticus.

3. The SUBCLAVIUS—*Arises*, by a flat tendon, from the cartilage of the first rib, and forms a broad fleshy belly, which is

Inserted into the inferior surface of the clavicle, beginning about one inch from the sternum, and continuing as far as the ligamentous connection of the clavicle to the coracoid process.

This muscle is situated between the clavicle and sternum, and is concealed by the pectoralis major, and the anterior part of the deltoid.

Use: to draw the clavicle downwards and forwards, and perhaps to elevate the first rib.

Having lifted up the pectoralis minor from its origin, the situation of the subclavian vessels which pass under the clavicle, and over the first rib, may be seen.

OF THE PARTS WITHIN THE THORAX.

The cavity of the thorax may now be opened, by cutting through the cartilages of the ribs on each side, and separating the lower part of the sternum from the diaphragm. That bone must then be lifted upwards and removed, by separating it at its articulations with the clavicle. This will allow us to examine more readily the great vessels passing out of the thorax.

On looking under the sternum, while it is lifted up, we see the Mediastinum, separating, as it is gradually torn from the posterior surface of the sternum, into two layers, and thus forming a triangular cavity. This cavity is artificially produced, and is entirely owing to the method of raising the sternum.

When the sternum is laid back or removed, the following parts are to be observed:

The MEDIASTINUM, now collapsed, dividing the thorax into two distinct cavities, of which the right is the largest.

The lungs of each side lying distinct in these cavities.

The Pericardium, containing the heart, situated in the middle of the thorax, between the two laminæ of the mediastinum, and protruding into the left side.

The internal surface of the pleura, smooth, colorless, and glistening, lining the ribs, and reflected over the lungs.

1. The PLEURA.—Each side of the thorax has its particular pleura.—The pleuræ are like two bladders, situated laterally with respect to each other; by adhering together in the middle of the thorax, and passing obliquely * from the posterior surface of the sternum to the dorsal vertebræ, they form the mediastinum.—The pleura lines the ribs, and the upper surface of the diaphragm, and is reflected over the lung, which is in fact behind it; it forms the ligamentum latum pulmonis, a reflection of this membrane, which connects the inferior edge of the lungs to the spine and diaphragm.

2. The LUNGS.—Reddish in children, greyish in adults, and blue in old age. Their shape corresponds to that of the thorax, being pyramidal, convex towards the ribs, concave towards the diaphragm, and irregularly flattened next the mediastinum.

The Right Lung is the larger, and is divided into three lobes, two large ones, and an intermediate smaller lobe.

The Left Lung has two lobes, and also a square notch opposite the apex of the heart. Into the sulci or

* They run obliquely, not being in general attached to the middle of the sternum, but towards its left side, especially at the lower part of the bone, near the diaphragm. Besides the pericardium, the mediastinum contains betwixt its laminæ some adipose membrane and absorbent glands.

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grooves which form the divisions of the lungs into lobes, the pleura enters; that part of the lung which is affixed to the spine, is called its root; through it the great vessels enter.

3. The PERICARDIUM is a strong, white, and compact membrane, smooth and lubricated upon the inside, forming a bag for containing the heart, and having its inner lamina reflected over the substance of the heart itself.

4. When you slit open the fore part of the pericardium, you expose the HEART. The right ventricle protrudes; the right auricle also is towards you; while the left auricle is concealed, and only its tip is seen lapping round upon the left ventricle. From under this tip of the left auricle, a branch of the coronary vein, and of the coronary artery, ramify towards the apex of the heart, marking the situation of the septum cordis. The left ventricle will be found firm, fleshy, and resisting, whilst the right ventricle is more loose, and seems partly wrapt round the other.

The heart is situated obliquely in the middle of the breast; its posterior surface is flat, and lies upon the diaphragm; its apex is turned forwards, and towards the left side, so that, in the living body, it is felt striking between the fifth and sixth ribs, at the point where the cartilages and bony extremities are united. The VENA CAVA SUPERIOR is seen coming down from the upper angle of the pericardium. The INFERIOR CAVA is seen coming up through the diaphragm; but only a very small part of this vein is covered by the pericardium; the two veins enter the right auricle. The RIGHT AURICLE is turned forwards, and might be called the anterior; it generally appears black, from the blood shining through its thin coats. The RIGHT VENTRICLE is situated almost directly opposite. The PULMONARY ARTERY arises from the right ventricle; its root is concealed by the right auricle; it ascends on the left side of the

aorta, and divides into the right and left pulmonary arteries: the right passes under the arch of the aorta, crosses behind it and the vena cava superior to the right lung, and is the longer; whilst the left pulmonary artery passes to the left lung, crossing the descending aorta anteriorly. The PULMONARY VEINS enter the left auricle, two veins come from each lung; the right veins are longer, because they pass behind the vena cava superior. The left auricle is situated on the left side of the right auricle, and somewhat behind it; its tip is seen lapping round upon the LEFT VENTRICLE; this is situated behind and on the left side of the right ventricle; its substance is stronger and more firm to the touch. The AORTA arises from the back part and right side of the left ventricle; its root is covered by the pulmonary artery; it then ascends betwixt that artery and the vena cava superior. Immmediately from the root of the aorta, within the pericardium, the two coronary arteries are sent off to supply the heart itself.

As the VENA CAVA SUPERIOR descends before the root of the lungs, and on the right side of the aorta, immediately before it perforates the pericardium, it is joined upon its posterior part by the vena azygos, which comes forwards from the spine, returning the blood from the intercostal spaces.

Behind the sternum, and just above the arch of the aorta, the superior cava is seen receiving two great branches:

One from the right side, formed by the right subclavian vein, and the right internal jugular; and another, which is larger, from the left side; formed by the left subclavian and the left internal jugular. This trunk crossing in front of the arteries arising from the arch of the aorta, enters the superior vena cava. Into the posterior part of the angle formed by the union of the left subclavian and the left jugular, the thoracic duct empties itself.

On each side of the neck, the internal jugular vein will be seen descending by the side of the carotid, while the subclavian vein comes from the arm.

The VENA CAVA INFERIOR, immediately after passing through the diaphragm from the abdomen, enters the pericardium.

The AORTA leaves the heart opposite the fourth dorsal vertebra; it crosses over the pulmonary artery, ascends obliquely upwards, backwards, and to the right side, as high as the second dorsal vertebra. Here it forms an ARCH or incurvation, which passes from the right to the left side, and at the same time obliquely from before backwards; it then comes in contact with the upper part of the third dorsal vertebra, and descends along the spine in the posterior mediastinum. This arch of the aorta is situated behind the first bone of the sternum, behind and somewhat below the left branch of the vena cava superior.

From the upper part of the arch come off three large arteries:

The ARTERIA INNOMINATA, or common trunk of the right carotid and subclavian; the LEFT CAROTID and the LEFT SUBCLAVIAN.

The student should observe also the THYMUS gland; a soft glandular body, lying before the lower part of the trachea and the great vessels of the heart, a little higher than the tops of the two pleuræ. It is very large in the fœtus, smaller in adults, and nearly disappears in the aged.

Where the aorta begins to descend, it is connected to the pulmonary artery by a ligament, which, in the fœtus, was a large canal, the DUCTUS ARTERIOSUS.

The heart may be now removed.

DISSECTION OF THE HEART, WHEN REMOVED FROM THE BODY.

The heart consists of three tunics or coats. 1. An external smooth one, which is a reflection of the inter-

nal lamina of the pericardium.   2. A middle muscular coat.   3. A smooth internal coat, which is a continuation of the internal coat of the great veins and arteries. In the right side of the heart we always meet with a considerable quantity of coagulated blood.   In the left side there is much less.

Slit open with the scissors the two venæ cavæ on their fore part; the inner surface of these veins, and of the right auricle, will be seen lined by a smooth membrane; and in the auricle, the musculi pectinati, or bundles of muscular fibres, will be seen projecting.   At the point of union between the two cavæ, there is a projection formed by the thickening of the muscular coat, called the TUBERCULUM LOWERI.   The SEPTUM AURICULARUM is seen separating the right from the left auricle;—observe that it is thin, that in it there is an oval depression, named FOSSA OVALIS.   Round this fossa the fibres are thicker, forming the annulus ovalis; this is the remains of the FORAMEN OVALE of the fœtus; and in many adult subjects a probe may be passed through the superior part of the fossa obliquely into the left auricle.   The VALVULA NOBILIS, or Eustachian Valve, is a membrane-like duplicature of the inner coat of the auricle, observed where the vena cava inferior is continued into the auricle, and stretching from that vein towards the opening into the right ventricle.   This valve is sometimes found reticulated.   Behind this valve is the orifice of the CORONARY VEIN, with its small valve.

The foramina Thebesii are minute orifices of veins, which open into all the cavities of the heart; they are most numerous, however, in the right auricle.

The OSTIUM VENOSUM, or opening of the right auricle into the right ventricle, is somewhat oval; it has a valve which projects into the right ventricle.

The RIGHT VENTRICLE may now be opened by an incision, carried from the root of the pulmonary artery

down to the apex of the heart. This incision should be made with care, lest the parts on the inside of the ventricle be destroyed by it; it should pass along the right side of the septum ventriculorum, the situation of which is marked out by large branches of the coronary artery and vein. A small opening should first be made, into which one blade of the scissors can be introduced: the incision may be continued through the apex of the heart, or a flap may be made by another cut, passing from the beginning of the first along the margin of the right auricle. In this ventricle, observe the project- ing bundles of muscular fibres, the TRICUSPID VALVES arising from the margin of the ostium venosum, and projecting into the right ventricle. This valve forms a complete circle at its base, but has its edge divided into three parts, which are attached by tendinous fila- ments, named CHORDÆ TENDINÆ, to the COLUMNÆ CARNEÆ, or muscular bundles of the ventricle.

The SEPTUM VENTRICULORUM, or partition of the two ventricles, is marked out externally by two veins running from the apex to the basis of the heart.

Slit up the pulmonary artery: observe how it arises from the back part of the right ventricle, how smooth the inside of the ventricle becomes as it approaches the entrance of the artery, or ostium arteriosum. Ob- serve the three SEMILUNAR or Sigmoid VALVES. Their bases arise from the artery, their loose edges project into its cavity, and in the middle of the loose edge of each valve is seen a small white body, termed CORPUS SESAMOIDEUM Aurantii. The artery is seen bifurcating into the right and left pulmonary arteries, and, just before its bifurcation, sending off to the aorta the ductus arteriosus, which in the adult is a ligament.

The LEFT AURICLE has four pulmonary veins opening into its cavity, which may be exposed by slit- ting up two of these veins. Observe that its coats are thicker than those of the right auricle. The septum

auricularum, with the fossa ovalis, is here seen less distinctly than on the right side. Observe also the ostium venosum, opening into the left ventricle, and giving attachment to the VALVULA MITRALIS.

The LEFT VENTRICLE may be opened in the same manner as the right, by an incision carefully made in the left side of the septum or partition of the ventricles, and continued round the upper part of the ventricle, under the auricle. Observe the great thickness of the muscular coat; the VALVULA MITRALIS, forming two projections, which are attached by the chordæ tendi-neæ to the fleshy columns of this ventricle.

Slit up the aorta; it has three semilunar valves, which resemble those of the pulmonary artery:—behind these valves the artery bulges out, forming the SINUSES of the aorta. Above two of the valves lie the orfices of the two coronary arteries; of which the left is the larger.

CHAPTER IX.

DISSECTION OF THE MUSCLES OF THE FACE.

UNDER the integuments of the face, there is always a considerable quantity of adipose membrane; many of the muscles are very slender, and, lying embedded in this fat, require careful dissection. The whole side of the face is also supplied with numerous ramifications of the fascial nerve, or portio dura of the seventh pair. These nervous twigs are generally removed with the integuments.

Twelve pair of muscles, and one single muscle, are described in this dissection.

1. The ORBICULARIS PALPEBRARUM or orbicularis oculi—*Arises*, from the internal angular process of the frontal bone, and from a tendon at the inner angle of the eye, by a number of fleshy fibres which pass round the orbit, covering first the superior, and then the inferior eye-lid, and also the bony edges of the orbit.

Inserted, by a short round tendon, into the nasal process of the superior maxillary bone.

This muscle is intermixed, at its upper part, with the occipito-frontalis; it covers the upper part of the lacrymal sac, and should be divided into the external and internal muscles. The internal is the *ciliaris* which covers the cartilages of the eye-lids, which are called the Cilia or Tarsi.

Use: To shut the eye, by bringing down the upper lid, and pulling up the lower; the fibres contracting towards the inner angle, as to a fixed point, compress the eye-ball and lacrymal gland, and convey the tears towards the puncta lacrymalia.

2. The CORRUGATOR SUPERCILII—*Arises*, fleshy, from the internal angular process of the os frontis; it runs outwards and a little upwards, to be

Inserted into the inferior fleshy part of the occipito-frontalis muscle, extending outwards as far as the middle of the superciliary ridge.

This muscle is concealed by the occipito-frontalis. It lies close to the upper and inner part of the orbicularis palpebrarum, with which it is connected.

Use: To smooth the skin of the forehead, by pulling it down after the action of the occipito-frontalis. When it acts more forcibly, it pulls down the eyebrow and skin of the forehead, and produces vertical wrinkles.

3. The COMPRESSOR NARIS—*Arises*, narrow, from the outer part of the ala nasi, and neighbouring part of the os maxillare superius. From this origin a

number of thin separate fibres run up obliquely along the cartilage of the nose toward the dorsum nasi, where the muscle joins its fellow, and is

Inserted, slightly, into the lower part of the os nasi and nasal process of the superior maxillary bone.

It is superficial; its origin is connected with the levator labii superioris alæque nasi; and its upper part with some of the descending fibres of the occipito-frontalis.

Use: To compress the ala towards the septum nasi; but, if the fibres of the occipito-frontalis, which adhere to it, act, the upper part of this muscle assists in drawing the ala outwards. It also corrugates the skin of the nose.

4. LEVATOR LABII SUPERIORIS ALÆQUE NASI— *Arises* by two distinct origins; the first from the nasal process of the superior maxillary bone, where it joins the os frontis at the inner canthus of the eye; it descends along the nasal process, and is *inserted* into the outer part of the ala nasi, and into the upper lip. The second *arises*, broad and fleshy, from the external orbitar process of the superior maxillary bone, immediately above the foramen infra-orbitarium; it runs down, becoming narrower, and is *inserted* into the upper lip and orbicularis oris.

The first portion of this muscle is sometimes called Levator Labii Superioris Alæque Nasi; and the second, *Levator Labii Superioris Proprius.* Their origins are partly covered by the orbicularis palpebrarum. They descend more outwardly than the ala nasi.

Use: To raise the upper lip and dilate the nostril.

The infra-orbitary artery, vein, and nerve, are seen emerging from the infra-orbitary foramen under this muscle.

5. ZYGOMATICUS MINOR—(often wanting) *Arises*

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from the upper prominent part of the os malæ, and, descending obliquely downwards and forwards, is

Inserted into the upper lip near the corner of the mouth.

Use: To draw the corner of the mouth and upper lip obliquely upwards and outwards.

6. ZYGOMATICUS MAJOR—*Arises*, fleshy, from the os malæ, near the zygomatic suture.

Inserted into the angle of the mouth, appearing to be lost in the depressor anguli oris, and orbicularis oris.

Its origin is partially covered by the orbicularis palpebrarum; it lies more outwardly than the zygomaticus minor.

Use: To draw the corner of the mouth and under lip upwards and outwards.

7. The LEVATOR ANGULI ORIS, or Levator labiorum communis—*Arises*, thin and fleshy, from a depression of the superior maxillary bone, between the root of the socket of the first dens molaris, and the foramen infra-orbitarium.

Inserted into the angle of the mouth.

It lies more outwardly than the levator labii superioris alæque nasi, and is in part concealed by that muscle, by the zygomaticus minor, and part of the zygomaticus major. At its insertion it is particularly connected with the depressor anguli oris.

Use: To draw the corner of the mouth upwards.

8. The DEPRESSOR ANGULI ORIS—*Arises*, broad and fleshy, from the base of the maxillary bone, near the chin, and, gradually becoming narrower, is

Inserted, into the angle of the mouth, uniting with the zygomaticus major, and levator anguli oris: it is also firmly connected with the platysma myoides.

Use: To pull down the corner of the mouth.

9. The DEPRESSOR LABII INFERIORIS, or Quadratus Genæ—*Arises*, fleshy and broad, from the side

of the lower jaw, a little above its lower edge; it runs obliquely upwards and inwards, and is

Inserted into the edge of the under lip.

This muscle, at its insertion, decussates with its fellow. It is in part covered by the depressor anguli oris, and forms the thick part of the chin, and has its fibres interwoven with fat.

Use: To pull the under lip downwards.

10. The BUCCINATOR—*Arises*, tendinous and fleshy, from the lower jaw, as far back as the root of the coronoid process; from the upper jaw, as far back as the pterygoid process of the sphenoid bone; it then continues to arise from the alveolar processes of both jaws, as far forwards as the dentes cuspidati. The fibres run forwards, and are

Inserted into the angle of the mouth.

This muscle lies deep, adheres to the membrane that lines the mouth; and a quantity of fat is always found between its fibres and the other muscles and integuments. It is partly concealed by the masseter, and by the muscles which pass to the angle of the mouth, as the levator and depressor anguli oris, and zygomaticus major. It is inserted behind these muscles. In the cheek it is connected with the platysma myoides, and is perforated by the duct of the parotid gland.

Use: To draw the angle of the mouth backwards and outwards, and to contract its cavity, by pressing the cheek inwards.

The single muscle is the

ORBICULARIS ORIS.—It consists of two planes of semicircular fibres, which decussate at the angles of the mouth. These fibres are formed chiefly by the muscles which are inserted into the lips; they surround the mouth. The superior portion runs along the upper lip, the inferior along the lower.

It is connected and intermixed with the insertions

of all the preceding muscles of the face. Some of
the fibres are connected to the septum nasi, and are
by Albinus termed Nasalis Labii Superioris.

Use: To shut the mouth, by contracting and draw-
ing both lips together; and to antagonize the muscles
inserted into the lips.

11. DEPRESSOR LABII SUPERIORIS ALÆQUE NASI,
Arises, thin and fleshy, from the os maxillare supe-
rius, where it forms the alveoli of the dentes incisivi
and dens caninus; thence it runs up under part of the
levator labii superioris alæque nasi.

Inserted into the upper lip and root of the ala nasi.

It is concealed by the orbicularis oris and levator
labii superioris alæque nasi, but may be discovered
by inverting the upper lip, and dissecting on the side
of the frenum which connects the lip to the gums.

Use: To draw the upper lip and ala nasi down-
wards and backwards, and to compress the nostril.

12. The LEVATOR LABII INFERIORIS or Superbus.
Arises from the lower jaw at the root of the alveolus
of the lateral incisor.

Inserted into the under lip and skin of the chin.

These two small muscles are found by the side of
the frenum of the lower lip. They lie under the
depressor labii inferioris.

Use: To raise the under lip and skin of the chin,
and to protrude the lip.

We have still remaining two strong muscles on the
side of the face, and two other muscles concealed by   ·
the angle of the inferior maxilla.

1. The MASSETER is divided into two portions,
which decussate one another.

The anterior portion *arises,* tendinous and fleshy,
from the superior maxillary bone, where it joins the
os malæ; from the lower edge of the os malæ, and
from its zygomatic process. The strong fibres run
obliquely downwards and backwards, and are *inserted*
into the outside of the angle of the lower jaw.

The Posterior portion *arises*, principally fleshy, from the inferior surface of the os malæ, and of the whole of the zygomatic process, as far back as the tubercle before the socket for the condyle of the lower jaw. The fibres run forward, and are *inserted*, tendinous, into the outer surface of the coronoid process of the lower jaw.

The anterior portion conceals almost the whole of the posterior. The greater part of this muscle is superficial.

Use: To pull up the lower jaw, for performing the grinding or lateral motions.

2. Temporalis—*Arises*, fleshy, from a semicircular ridge in the lower and lateral part of the parietal bone, from all the squamous portion of the temporal bone, from the external angular process of the os frontis, from the temporal process of the sphenoid bone, and from an aponeurosis which covers the muscle. From these different origins the fibres converge, descend under the bony jugum formed by the zygomatic processes of the temporal and cheek bones.

Inserted, by a strong tendon, into the upper part of the coronoid process of the lower jaw, to which it adheres on every side, but more particularly on its anterior part.

Its insertion is concealed by the jugum and by the masseter; so that, to expose it, the masseter must be cut away.

Use: To raise the lower jaw.

To expose the following muscles, we must remove those of the cheek and jaw; the masseter and the insertion of the temporalis must be taken away, and the coronoid process of the inferior maxilla removed by a saw.

3. The Pterygoideus Externus—*Arises*, from the outer side of the external plate of the pterygoid process of the sphenoid bone, from part of the tube-

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rosity of the os maxillare adjoining to it, and from the root of the temporal process of the sphenoid bone. It passes backwards and outwards, to be

Inserted into a depression in the neck of the condyloid process of the lower jaw, and into the anterior and inner part of the ligament of the articulation of that bone.

This muscle passes almost transversely from the skull to its insertion. It is concealed by the muscles of the face and neck, and by the ascending processes of the lower jaw.

Use: When this pair of muscles act together, they bring the jaw horizontally forwards. When they act singly, the jaw is moved forwards, and to the opposite side.

4. The PTERYGOIDEUS INTERNUS—*Arises*, tendinous and fleshy, from the inner and upper part of the internal plate of the pterygoid process of the sphenoid bone, filling all the space between the two plates; and from the pterygoid process of the os palati between these plates.

Inserted, by tendinous and fleshy fibres, into the inside of the angle of the lower jaw.

To expose this muscle, the jaw must be removed from its articulating cavity, and then pulled forwards, and toward the opposite side; or it may be sawn across at its sympyhsis, and the other half removed. It is larger than the pterygoideus externus; and betwixt the two muscles there is a considerable quantity of cellular membrane, and the trunk of the inferior maxillary and gustatory nerves. Like that muscle, it is concealed by the lower jaw and facial muscles. Along its posterior edge we observe the Ligamentum Laterale Maxillæ Inferioris, a ligamentous band, which extends from the back part of the styloid process to the angle of the lower jaw.

Use: To draw the jaw upwards, and obliquely towards the opposite side, or to move it laterally.

On the side of the face is situated a considerable salivary gland, the PAROTID GLAND, a large white mass, irregularly oblong and protuberant, filling up all the space between the angle and the ascending processes of the jaw, the mastoid process, root of the cartilage of the ear, and zygomatic process of the temporal bone. From its anterior and upper part a white canal or duct passes forwards over the masseter, and perforates the buccinator from without inwards, opening into the mouth opposite the first dens molaris. The coats of this duct are very thick and firm, consisting of a ligamentous substance.

CHAPTER X.

DISSECTION OF THE THROAT.

ON looking into the mouth, we observe a soft curtain hanging from the palate bones, named the VELUM PENDULUM PALATI, or soft Palate. The apex of the velum forms a small projecting glandular body, termed the UVULA, or pap of the throat. From each side of the Uvula, two muscular half arches or columns are sent down, the anterior to the root of the tongue, the posterior to the side of the pharynx. Between these half arches on each side, are situated the glands termed Amygdalæ, or tonsils. The common opening behind the anterior arch is named the Fauces, or Top of the Throat, from which there are six passages, two upwards, being one to each nostril, called the Posterior Nostrils; two at the sides, called Eustachian Tubes,

passing on each side to the ear;* two downwards, of which the anterior is the passage through the glottis and larynx into the trachea; the posterior, which is the largest, is the pharynx, or top of the œsophagus, and leads to the stomach.

MUSCLES SITUATED ABOUT THE ENTRY OF THE FAUCES.

These consist of four pairs, and a single muscle in the middle.

1. CONSTRICTOR ISTHMI FAUCIUM—*Arises*, by a slender beginning, from the side of the tongue, near its root; thence running upwards within the anterior arch, before the amygdala, it is

Inserted into the middle of the velum pendulum palati, as far as the root of the uvula. It is here connected with its fellow, and with the beginning of the palato-pharyngeus.

Situation: It forms the anterior half arch.

Use: To draw the velum towards the root of the tongue, which at the same time it raises; and, with its fellow, to contract the opening into the fauces.

2. The PALATO-PHARYNGEUS—*Arises*, by a broad beginning, from the root of the uvula in the middle of the velum pendulum palati, and from the tendinous expansion of the circumflexus palati. The fibres pass along the posterior arch behind the amygdalæ, and run backwards to the superior and lateral part of the pharynx, where they are scattered, and mixed with those of the stylo-pharyngeus.

Inserted into the edge of the upper and back part of

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* A probe may be introduced through the anterior nostrils into the Eustachian tube; the tube opens into the pharynx in a direction opposite to the space between the roots of the middle and inferior turbinated bones.

the thyroid cartilage, and into the back part of the pharynx; thus forming the posterior half arch or column.

Use: To draw the uvula and velum downwards and backwards, and pull the thyroid cartilage and pharynx upwards; to shut the passage into the nostrils, and, in swallowing, to thrust the food from the fauces into the pharynx.

The SALPINGO-PHARYNGEUS of Albinus is composed of a few fibres of this muscle, which *arise* from the anterior and lower part of the cartilaginous extremity of the Eustachian tube, and are *inserted* into the inner part of the last mentioned muscle.

3. The CIRCUMFLEXUS, or Tensor Palati,—*Arises*, from the spinous process of the sphenoid bone, behind the foramen ovale, and from the Eustachian tube near its osseous part; it runs down along the pterygoideus internus, and forms a round tendon, which passes over the hook of the internal plate of the pterygoid process of the sphenoid bone, and soon spreads into a broad tendinous expansion.

Inserted into the velum pendulum palati, and semilunar edge of the os palati.

Its insertion extends as far as the suture which joins the two ossa palati. Some of its posterior fibres generally join with the constrictor pharyngis superior and palato-pharyngeus.

Use: To stretch the velum, and draw it downwards, and to one side.

4. The LEVATOR PALATI—*Arises*, tendinous and fleshy, from the extremity of the petrous portion of the temporal bone, and from the Eustachian tube.

Inserted into the whole length of the velum pendulum palati, as far as the root of the uvula, uniting with its fellow.

Use: To draw the velum upwards and backwards,

so as to shut the passage from the fauces into the mouth and nose.

The single muscle is the

AZYGOS UVULÆ.—It *arises*, fleshy, from the extremity of the suture which unites the ossa palati; runs down the whole length of the velum, like a small earth-worm, adhering to the tendons of the circumflexi palati.

Inserted into the tip of the uvula.

Use: To raise the uvula upwards and forwards, and shorten it.

MUSCLES ON THE BACK PART OF THE PHARYNX.

Of these there are three pair.

1. The CONSTRICTOR PHARYNGIS INFERIOR. This muscle *arises*, from the outside of the ala of the thyroid cartilage, near the attachment of the thyro-hyoideus muscle, and from the side of the cricoid cartilage, near the crico-thyroideus.

Inserted into the white line on the back part of the pharynx, where it is united to its fellow.

This muscle covers the under part of the middle constrictor; the superior fibres run obliquely upwards, while the inferior fibres have a transverse direction, and surround the œsophagus.

Use: To compress that part of the pharynx which it covers, and to raise it with the larynx a little upwards.

2. The CONSTRICTOR PHARYNGIS MEDIUS—*Arises* from the superior edge of the cornu of the os hyoides, extending as far forwards as the graniform process, or appendix; and from the ligament which connects the os hyoides to the thyroid cartilage. The superior fibres ascend obliquely, the others run more transversely.

Inserted into the cuneiform process of the os occipitis, before the foramen magnum, and into a white

line in the middle of the posterior surface of the pharynx, where it is joined to its fellow.

The lower part of this muscle is covered by the muscle last described, while the upper part covers the inferior fibres of the constrictor superior.

Use: To compress that part of the pharynx which it invests, and to draw it and the os hyoides upwards.

3. CONSTRICTOR PHARYNGIS SUPERIOR—*Arises,* above, from the cuneiform process of the os occipitis, before the foramen magnum; lower down from the pterygoid process of the sphenoid bone; from the upper and under jaw, near the alveolar processes of the last dentes molares; and from the back part of the buccinator muscle. Some fibres also come from the root of the tongue, and from the palate.

Inserted into a white line in the middle of the posterior surface of the pharynx.

The larger part of this muscle is covered by the constrictor medius.

Use: To compress the upper part of the pharynx, and draw it forwards and upwards.

MUSCLES OF THE LARYNX.

The Larynx is composed of five Cartilages: 1. The THYROID CARTILAGE, situated immediately below the os hyoides in the middle of the throat. 2. The CRICOID Cartilage, situated immediately below the thyroid cartilage, betwixt it and the superior rings of the trachea. 3. The EPIGLOTTIS, a broad triangular cartilage, very elastic, situated behind the root of the tongue, and covering the entrance into the upper part of the larynx. 4 & 5. The arytænoid cartilages, two small bodies, like peas, situated behind the thyroid cartilage, on the upper edge of the back part of the cricoid cartilage, and between the two alæ or wings of the thyroid cartilage. These two small cartilages

form between themselves and the thyroid a longitu-
dinal fissure, extending from before backwards, which
is called the Glottis, or Rima Glottidis, and leads to
the trachea.

The muscles situated about the glottis consist of
four pairs of small muscles, and a single one.

1. The CRICO-ARYTÆNOIDEUS POSTICUS—*Arises*,
fleshy, from the posterior part of the cricoid cartilage.

Inserted, narrow, into the back part of the arytæ-
noid cartilage of the same side.

Use: To open the rima glottidis a little, and, by
pulling back the arytænoid cartilage, to render the
ligament of the glottis tense.

2. The CRICO-ARYTÆNOIDEUS LATERALIS—*Arises*,
fleshy, from the side of the cricoid cartilage, where
it is covered by the ala of the thyroid cartilage.

Inserted into the outer side of the arytænoid carti-
lage, lying more forward than the last described
muscle.

Use: To open the rima glottidis, by pulling the
ligaments from each other.

3. The THYRO-ARYTÆNOIDEUS—*Arises* from the
middle and inferior part of the posterior surface of
the thyroid cartilage; runs backwards, and a little
upwards, and is

Inserted into the fore part of the arytænoid carti-
lage, farther forward than the muscle last described.

Use: To pull the arytænoid cartilage forwards, and
thus shorten the ligament of the larynx or glottis.

4. ARYTÆNOIDEUS OBLIQUUS—*Arises* from the base
of one arytænoid cartilage; and, crossing its fellow, is

Inserted into the tip of the other arytænoid carti-
lage.

Use: When both act, they pull the arytænoid carti-
lages towards each other.

The single muscle is the

ARYTÆNOIDEUS TRANSVERSUS, which *arises* from

the whole length of one arytænoid cartilage, and passes across to be

Inserted into the whole length of the other arytænoid cartilage.

It is situated anterior to the arytænoidei obliqui.

Use: To shut the rima glottidis, by bringing the arytænoid cartilages together:

On each side of the larynx, there are also a few muscular fibres, which are named as follows.

1. THYRO-EPIGLOTTIDEUS—*Arising*, by a few pale separated fibres from the thyroid cartilage, and

Inserted into the side of the epiglottis.

Use: To draw the epiglottis obliquely downwards, or, when both muscles act, directly downwards; and at the same time to expand it.

2. The ARYTÆNO-EPIGLOTTIDEUS — *Arises*, by a few slender fibres, from the lateral and upper part of the arytænoid cartilage, and is

Inserted into the epiglottis, along with the former muscle.

Use: When both muscles act, to pull the epiglottis close upon the glottis.

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CHAPTER XI.

DISSECTION OF THE ORBIT OF THE EYE.

THE globe or ball of the eye is situated about the middle of the orbit. It is connected to the bone by its muscles, and by the optic nerve; and all these parts are embedded posteriorly in a soft, fatty substance, which fills up the bottom of the orbit. The tunica, or membrana conjunctiva, is seen lining the inner surface of the eye-lids, and reflected from them over the anterior part of the globe of the eye, so that the back part of the eye-ball, and all the muscles and nerves, are situated behind it. This membrane must therefore be dissected away; the upper part of the orbit, which is formed by the os frontis, must be removed with a saw, and the fat surrounding the muscles, vessels, and nerves, cautiously dissected away with the scissors.

MUSCLES SITUATED WITHIN THE ORBIT.

Seven muscles are contained within the orbit, of which one belongs to the upper eye-lid, and six to the globe of the eye.

1. The LEVATOR PALPEBRÆ SUPERIORIS—*Arises*, by a small tendon, from the upper part of the foramen opticum of the sphenoid bone; the tendon forms a broad flat belly.

Inserted, by a broad thin tendon, into the upper eye-lid, adhering to the tarsal cartilage, which gives form to the eye-lid.

Use: To open the eye, by drawing the superior eye-lid upwards.

There are four straight muscles, or recti, belonging to the globe of the eye. These four muscles resemble each other, all arising by narrow tendons from the margin of the foramen opticum, where they surround the optic nerve; all forming strong fleshy bellies, and inserted, by broad, thin tendons, at the fore part of the globe of the eye, into the tunica sclerotica, or outer tunic of the eye, and under the tunica conjunctiva. They are distinguished from each other by the terms Levator, Depressor, Abductor and Adductor.

2. The LEVATOR OCULI—*Arises,* by a narrow tendon, from the upper part of the foramen opticum of the sphenoid bone; it forms a fleshy belly, and is

Inserted into the superior and anterior part of the tunica sclerotica, by a broad thin tendon.

It lies below the levator palpebræ superioris, and raises the globe of the eye.

3. The DEPRESSOR OCULI—*Arises* from the inferior margin of the foramen opticum, and is

Inserted into the inferior and anterior part of the tunica sclerotica.

Use: To move the globe of the eye downwards.

4. The ADDUCTOR OCULI—*Arises* from the inner part of the foramen opticum, and is

Inserted into the inner and anterior part of the tunica sclerotica.

It is the shortest of the four recti muscles, and draws the eye towards the nose.

5. The ABDUCTOR OCULI—*Arises* from the outer part of the foramen opticum.

Inserted into the outer part of the tunica sclerotica.

It is the longest of the recti, and moves the globe outwards.

The next two are the oblique muscles.

6. The OBLIQUUS SUPERIOR, or Trochlearis, *Arises*, by a small tendon, from the margin of the foramen opticum, between the levator and abductor oculi. Its long slender belly runs along the inner side of the orbit to the internal angular process of the os frontis, where a cartilaginous pulley is fixed. The muscle then forms a tendon, which passes through the pulley, runs obliquely downwards and outwards, inclosed in a membranous sheath; and becoming broader and thinner, is

Inserted into the tunica sclerotica, about half way between the insertion of the levator oculi, and the entrance of the optic nerve.

Use: To roll the globe of the eye, and turn the pupil downwards and outwards.

7. The OBLIQUUS INFERIOR—*Arises*, narrow, and principally tendinous, from the outer edge of the orbitar process of the superior maxillary bone, near its junction with the os unguis. It runs obliquely outwards and backwards, under the depressor oculi, and is

Inserted, by a broad thin tendon, into the sclerotica, between the entrance of the optic nerve, and the insertion of the abductor oculi.

Use: To draw the globe of the eye forwards, inwards, and downwards, and to turn the pupil upwards.

In the orbit, we also meet with the LACHRYMAL GLAND.—This gland is of a yellowish color; it is situated in a depression of the os frontis near the temple. It adheres closely to the fat which surrounds the muscles and posterior convexity of the eye. It sends off several small ducts which pierce the tunica conjunctiva lining the upper eye lid; these ducts cannot be seen, unless the part be macerated in water, when they are filled with the liquid.

The PUNCTA LACHRYMALIA are two small holes near the internal angle of the palpebræ, situated one in each eye-lid. They lead into the LACHRYMAL SAC.

This sac is an oblong membranous bag, situated at the inner angle of the eye, in a depression formed by the os unguis, and nasal process of the superior maxillary bone.   It receives the tears by the puncta lachrymalia, and from the sac they are conveyed into the nose by a DUCT, named the LACHRYMAL, or NASAL.   The lower extremity of this duct opens into the nose on one side of the antrum maxillare, and under the os spongiosum inferius.   A probe, with its extremity bent, may be introduced from the nose through this duct into the lachrymal sac.

The Caruncula Lachrymalis is a small reddish granulated body, situated at the internal angle of the palpebræ.

CHAPTER XII.

DISSECTION OF THE MUSCLES ON THE POSTERIOR PART OF THE TRUNK AND NECK.

FROM the number and intimate connection of these muscles, their description is necessarily complicated, and their dissection difficult.   The smaller muscles, indeed, cannot be separated without dividing some of their fibres.   We do not here, as in the limbs, find the muscles distinctly marked, loosely connected by cellular membrane, and separated with facility; but closely united, and in many places having their fibres so intermixed, as to render their divisions indistinct and uncertain.

In this dissection we meet with twenty-two distinct pairs of muscles, besides a number of small muscles situated between the processes of contiguous vertebræ.

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On removing the integuments of the posterior part of the neck and back, which may be done by making an incision along the whole length of the spine, another from the tubercle of the occipital bone to the acromion, and a third from the acromion to the last dorsal vertebra; we expose,

1. The TRAPEZIUS, or CUCULLARIS.—It *arises*, by a thick round tendon, from the lower part of the protuberance in the middle of the os occipitis behind, and, by a thin tendinous expansion, from the superior transverse ridge of that bone; from the five superior cervical spinous processes by the ligamentum nuchæ; tendinous, from the two inferior cervical spinous processes, and from the spinous processes of all the vertebræ of the back. The fleshy fibres coming from the neck descend obliquely, while those from the back ascend.

Inserted, fleshy, into the posterior third part of the clavicle; tendinous and fleshy, into the acromion, and into the upper edge of all the spine of the scapula. The fibres slide over a triangular surface at the extremity of the spine of that bone.

Situation: This muscle is quite superficial, and conceals all the muscles situated in the posterior part of the neck, and upper part of the back. It adheres to its fellow the whole length of its origin. Its anterior fibres lie posterior to those of the sterno-mastoideus, but are not in contact with them, a considerable quantity of adipose substance being interposed. The posterior cervical ligament (ligamentum nuchæ vel colli) is a ligament which arises from the middle of the occipital bone, runs down on the back part of the neck, adhering to the spinous processes of the cervical vertebræ, and giving origin to the fibres of the trapezius, and of other muscles.

Use: To move the scapula in different directions. The superior fibres draw it obliquely upwards, the middle transverse ones draw it directly backwards,

and the inferior fibres move it obliquely donwnwards and backwards. Also, to draw back the head, and contribute to its rotatory motions.

This muscle should now be reflected from the spine and head.

2. The LATISSIMUS DORSI—*Arises*, by a broad thin tendon, from all the spinous processes of the os sacrum, and of the lumbar vertebræ; from the spinous processes of the seven inferior dorsal vertebræ; from the posterior part of the spine of the os ilium; also from the extremities of the four inferior false ribs, by four distinct fleshy digitations, which intermix with those of the obliquus externus abdominis. The inferior fleshy fibres ascend obliquely; the superior run transversely: they pass over the inferior angle of the scapula (from which the muscle often receives a thin fasciculus of fibres,) to reach the axilla, where they are all collected and twisted.

Inserted, by a strong flat tendon, into the inner edge of the groove in the os humeri, which receives the long tendon of the biceps flexor cubiti.

Where this muscle arises from the dorsal vertebræ, it is concealed by the origin of the trapezius. The remainder of it is placed immediately under the skin, and covers the deeper seated muscles of the loins and back. It is situated superior to the gluteus maximus, and posterior to the obliquus externus abdominis. Its insertion cannot be traced till the muscles of the arm are dissected; it forms the fold on the posterior part of the hollow of the arm pit. The tendon of this muscle, with the subjacent tendon of the serratus posticus inferior, assists in forming the fascia lumborum.

Use: To pull the arm backwards and downwards, and to roll the os humeri.

Having removed the trapezius and latissimus dorsi, two muscles will be seen passing from the neck to the scapula.

3. The RHOMBOIDEUS. This muscle is divided into two portions, rhomboideus major and minor.

Rhomboideus major (the inferior portion) *arises*, tendinous, from the spinous processes of the four or five superior dorsal vertebræ.

Inserted into all the base of the scapula below its spine.

Rhomboideus minor (the superior portion) *arises*, tendinous from the spinous processes of the three inferior vertebræ of the neck, and from the ligamentum nuchæ.

Inserted into the base of the scapula, opposite to the triangular plain surface at the root of the spine.

Situation: This muscle lies beneath the trapezius and latissimus dorsi; a small part of the rhomboideus major may be seen between these muscles, and the inferior part of the base of the scapula.

Use: To draw the scapula obliquely upwards, and directly backwards.

The rhomboidei should now be reflected from the spine.

4. The LEVATOR SCAPULÆ—*Arises* from the transverse processes of the five superior vertebræ of the neck, by five distinct, tendinous, and fleshy slips, which unite and form a considerable muscle.

Inserted, tendinous and fleshy, into the base of the scapula, above the root of the spine, and under the superior angle (not into the angle itself, as it is usually described.)

This muscle is concealed by the trapezius and sterno-mastoideus; but a small part of its belly may be seen in the space between the edges of these muscles. The origin of the levator scapulæ is partly cocealed by the splenius capitis; and the digitations, where they arise from the transverse processes, lie betwixt similar attachments of the scaleni muscles before, and of the splenius colli behind.

Use: To draw the scapula upwards, and a little forwards.

Detaching the rhomboideus from its origin in the spine, you will see another muscle passing from the whole of the basis of the scapula.

5. The SERRATUS MAGNUS, or Serratus Major Anticus—*Arises* by nine fleshy digitations, from the nine superior ribs. These digitations are seen on the anterior part of the thorax; they pass obliquely backwards, and form a strong fleshy muscle.

Inserted, principally fleshy, into the whole of the base of the scapula.

This muscle lies between the scapula and the ribs, so that, to see its course, the articulation of the clavicle to the sternum should be divided, and the scapula lifted from the trunk. It is concealed by the latissimus dorsi, by the two pectoral muscles, and the scapula. The only part of it which can be seen before the removal of those muscles, projects betwixt and below them on the side of the trunk. The lower digitations, which pass more anteriorly than the edge of the latissimus dorsi, are intermixed with the superior digitations of the obliquus externus abdominis. The superior digitations arise behind the pectoralis minor. The insertion of the muscle is between the subscapularis, which arises from the internal surface of the scapula, and the insertions of the rhomboideus and levator scapulæ.

Use: To move the scapula forwards, and, when the scapula is forcibly raised, to draw the ribs upwards. The upper extremity may now be removed from the trunk.

The removal of the rhomboideus also exposes,

6. The SERRATUS SUPERIOR POSTICUS. This muscle *arises*, by a thin broad tendon, from the spinous processes of the three inferior cervical vertebræ, and of the two superior dorsal.

Inserted, by distinct fleshy slips, into the second, third, fourth, and sometimes the fifth ribs, a little beyond their angle.

This muscle is concealed by the rhomboideus and scapula, except a few of its superior fibres, which appear above the upper edge of the rhomboideus minor.   It covers part of the origin of the splenius.

Use: To elevate the ribs, and dilate the thorax.

Reflect it from the spine.

7. The SPLENIUS is divided into two portions:

(1.) The Splenius Capitis—*Arises*, tendinous, from the spinous processes of the two superior dorsal, and five inferior cervical vertebræ.   It forms a flat broad muscle, which ascends obliquely, and is *inserted*, tendinous, into the posterior part of the mastoid process, and into a small part of the os occipitis, immediately below its superior transverse ridge.

This muscle is covered by the trapezius, and by the insertion of the sterno-cleido-mastoideus, and a small part of it is seen on the side of the neck betwixt those two muscles.   The lower part of its origin is covered by the serratus superior posticus.

Reflect it from the occiput.

(2.) The Splenius Colli—*Arises*, tendinous, from the spinous processes of the third, fourth, fifth, and sometimes the sixth dorsal vertebræ.   It forms a small fleshy belly, which ascends by the side of the vertebræ, and is *inserted* into the transverse processes of the four or five superior cervical vertebræ, by distinct tendons, which lie behind similar tendons of the levator scapulæ.

This muscle is concealed by the serratus superior posticus, and splenius capitis.

Use: To bring the head and upper vertebræ of the neck obliquely backwards.   When both muscles act, they pull the head directly backwards.

Reflect it from the dorsal vertebræ.

8. The Serratus Posticus Inferior—*Arises*, by a broad thin tendon, from the spinous processes of the two or three inferior dorsal vertebræ, and from the three superior lumbar spines by the fascia lumborum.

Inserted, by distinct fleshy slips, into the lower edges of the four inferior ribs, at a little distance from their cartilages.

This is a thin muscle, of considerable breadth, situated at the lower part of the back, under the middle of the latissimus dorsi.

Use: To pull the ribs downwards and backwards.

Reflecting it from the spine, you expose the Fascia Lumborum. It is a tendinous fascia, arising from the lumbar vertebræ and os sacrum, giving origin to the lower part of the serratus posticus inferior, and to the posterior fibres of the obliquus internus and transversalis abdominis. It is also connected with the tendon of the latissimus dorsi.

On detaching from the spine, this fascia, and the serratus posticus inferior, we expose a thick muscular mass, filling up all the space betwixt the spinous processes of the vertebræ, and the angles of the ribs. This mass consists of three muscles:

The Sacro-Lumbalis on the outside, the Longissimus Dorsi in the middle, and the Spinalis Dorsi close to the spinous processes.

These three muscles are closely connected together; so that, to effect their separation, it is necessary to divide some of the fibres.

9 and 10. The Sacro-Lumbalis and Longissimus Dorsi—*Arise*, by one common origin, tendinous externally, and fleshy internally, from the spinous processes and posterior surface of the os sacrum; from the posterior part of the spine of the os ilium; from the spinous processes, and from the roots of the transverse processes of all the lumbar vertebræ.

The thick fleshy belly, formed by this extensive

origin, ascends, and, opposite to the last rib, divides into the two muscles.

The sacro-lumbalis is *inserted* into all the ribs near their angles, by long and thin tendons. The tendons which pass to the superior ribs, are longer, ascend in nearly a straight line, and are situated nearer to the spine than those which pass to the lower ribs. On separating the inner edge of this muscle (*i. e.* the edge next to the spine) from the latissimus dorsi, and turning the belly towards the ribs, we see six or eight small tendinous and fleshy bundles, which pass from the inner side of this muscle, to be inserted into the upper edge of the six or eight inferior ribs. These are called the Musculi Accessorii ad Sacro-Lumbalem.

Use: To pull the ribs downwards, to assist in erecting the trunk of the body, and in turning it to one side.

The longissimus dorsi is *inserted* into all the ribs except the two inferior, betwixt their tubercles and angles, by slips which are tendinous and fleshy, and into the transverse processes of all the dorsal vertebræ by small double tendons. The insertions in the ribs proceed from the outer side of the muscle, while the attachments to the transverse processes are seen on separating the longissimus dorsi from the spinalis dorsi.

Use: To extend the vertebræ, and keep the body erect.

11. The Spinalis Dorsi is much smaller than the last two muscles; below, it cannot be separated from the longissimus dorsi, without dividing some fibres; it lies betwixt that muscle and the spine.

Arises, tendinous, from the spinous processes of the two superior lumbar vertebræ, and of the three inferior dorsal.

Inserted into the spinous processes of the vertebræ of the back, from the second to the ninth, by as many distinct tendons.

Use: To extend the vertebræ, and to assist in raising the spine.

The three last described muscles are covered below by the serratus posticus inferior and the latissimus dorsi; above, by the rhomboideus, serratus superior posticus, and trapezius.

12. The CERVICALIS DESCENDENS—*Arises*, from the upper edge of the four or five superior ribs, by as many distinct tendons. It forms a small belly, which ascends upwards, and is

Inserted, by three distinct tendons, into the transverse processes of the fourth, fifth, and sixth cervical vertebræ, between the splenius colli and levator scapulæ. This muscle is small, and is frequently described as an appendage to the sacro-lumbalis.

Use: To turn the neck obliquely backwards.

13. The TRANSVERSALIS COLLI—*Arises* from the transverse processes of the five superior dorsal vertebræ, by five tendinous and fleshy slips, and is

Inserted, tendinous, into the transverse processes of the five or six inferior cervical vertebræ.

The origin of this muscle lies on the inside of the longissimus dorsi, and it is sometimes considered as an appendage to it. The insertion is situated between the cervicalis descendens and the trachelo-mastoideus.

Use: To turn the neck obliquely backwards, and a little to one side.

14. The TRACHELO-MASTOIDEUS lies nearer to the bone than the last described muscle.

Arises from the transverse processes of the three uppermost vertebræ of the back, and of the five inferior of the neck, by thin tendons, which unite and form a fleshy belly.

Inserted, tendinous, into the posterior surface of the mastoid process.

This muscle lies on the outside of the complexus, and on the inside of the transversalis colli; its insertion

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is concealed by the splenius capitis; it is covered also by the levator scapulæ.

Use: To keep the head and neck erect, and to draw the head backwards, and to one side.

15. The COMPLEXUS—*Arises*, by tendinous and fleshy fibres, from the transverse processes of the seven superior dorsal, and of the four or five inferior cervical vertebræ. It forms a thick, tendinous, and fleshy belly.

Inserted, tendinous and fleshy, into the hollow betwixt the two transverse ridges of the os occipitis, extending from the middle protuberance of that bone, nearly as far as the mastoid process.

This is a large muscle. Its origin from the cervical vertebræ is nearer to the spine than the trachelo-mastoideus; and in the back, it arises nearer to the spine than the transversalis colli; it is covered by the splenius; but a large portion of it is seen between the splenius and spine, immediately on removing the trapezius.

Use: To draw the head backwards and to one side.

On removing the complexus from the occiput, we find, close to the spine,

16. The SEMI-SPINALIS COLLI.—It *arises* by distinct tendons, from the transverse processes of the six superior dorsal vertebræ, ascends obliquely close to the spine, and is

Inserted into the spinous processes of all the vertebræ of the neck, except the first and last.

This muscle is situated close to the vertebræ at the posterior part of the neck and back. It arises on the outside of the semi-spinalis dorsi; its greater part is concealed by the complexus and longissimus dorsi; and the part which projects between these muscles, is concealed by the serratus superior posticus.

Use: To extend the neck obliquely backwards.

17. SEMI-SPINALIS DORSI—*Arises* from the trans-

verse processes of the seventh, eighth, and ninth ver-
tebræ of the back, by distinct tendons which soon
grow fleshy.

Inserted, by distinct tendons, into the spinous pro-
cesses of the five superior dorsal vertebræ, and of the
two lower cervical.

This muscle lies nearer the spine than the lower
part of the semi-spinalis colli; its inferior origins lie
on the outside of the insertion of the spinalis dorsi.

Use: To extend the spine obliquely backwards.

The removal of the complexus brings also into view
several small muscles, situated at the superior part of
the neck, immediately below the occiput.

18.   The RECTUS CAPITIS POSTICUS MAJOR—
Arises, fleshy, from the side of the spinous process of
the dentata.   It ascends obliquely outwards, becoming
broader, and is

Inserted, tendinous and fleshy, into the inferior
transverse ridge of the os occipitis, and into part of
the concavity above that ridge.

Use: To extend and pull the head backwards, and
to assist in its rotation.

19.   The RECTUS CAPITIS POSTICUS MINOR—
Arises, tendinous and narrow, from an eminence in the
middle of the back part of the atlas.   It becomes
broader, and is

Inserted, fleshy, into the inferior transverse ridge
of the os occipitis, and into the surface betwixt that
ridge and the foramen magnum.

It is partly covered by the rectus capitis posticus
major; but a large portion of this pair of muscles is
seen projecting between the recti majores, and is
situated beneath the complexus.

Use: To draw the head backwards.

20. OBLIQUUS CAPITIS SUPERIOR—*Arises,* tendi-
nous, from the upper and posterior part of the trans-
verse process of the first cervical vertebra.

Inserted, tendinous and fleshy, into the inferior transverse ridge of the os occipitis behind the mastoid process, and into a small part of the surface above and below that ridge.

Use: To draw the head backwards, and to assist in rolling it.

21. OBLIQUUS CAPITIS INFERIOR—*Arises*, from the side of the spinous process of the dentata, forms a thick belly, and is

Inserted into the under and back part of the transverse process of the atlas.

Use: To rotate the head, by turning the first vertebra upon the second.

22. The MULTIFIDUS SPINÆ.

On removing the muscles of the spine which have been described, we find situated beneath them the Multifidus Spinæ. It is that mass of flesh which lies close to the spinous and transverse processes of the vertebræ, extending from the dentata to the os sacrum. The bundles of which it is composed seem to pass from the transverse, to be inserted into the spinous processes.

Arises, tendinous and fleshy, from the spinous processes and back part of the os sacrum, and from the posterior adjoining part of the os ilium; from the oblique and transverse processes of all the lumbar vertebræ; from the transverse processes of all the dorsal vertebræ; and from those of the cervical vertebræ, excepting the first three. The fibres arising from this extensive origin pass obliquely, to be

Inserted, by distinct tendons, into the spinous processes of all the vertebræ of the loins and back and neck, except the atlas. The fibres arising from each vertebra are inserted into the second one above it, and sometimes more.

Use: To extend the back obliquely, or move it to one side. When both muscles act, they extend the vertebræ backwards.

The small muscles situated between the processes of the vertebræ are,

1. INTERSPINALES colli, dorsi, et lumborum. These are small bundles of fibres, which fill up the spaces between the spinous processes of the vertebræ. Each of these little muscles arises from the surface of one spinous process, and is inserted into the next spinous process.

In the neck they are large, and appear double, as the spinous processes of the cervical vertebræ are bifurcated. In the back and loins they are indistinct, and are rather small tendons than muscles.

Use: To draw the spinous processes nearer to each other.

2. The INTERTRANSVERSALIS colli, dorsi, et lumborum, are small muscles which fill up, in a similar manner, the spaces between the transverse processes of the vertebræ. In the neck they are bifurcated and distinct; in the back they are small and slender, and in the loins they are strong and fleshy.

Use: To draw the transverse processes towards each other.

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CHAPTER XIII.

DISSECTION OF THE MUSCLES SITU- ATED BETWEEN THE RIBS, AND ON THE INNER SURFACE OF THE STERNUM.

THE muscles which fill up the space between the ribs are named Intercostals; they are disposed on each side of the thorax in two layers; and each layer consists of eleven muscles.

The INTERCOSTALES EXTERNI—*Arise* from the inferior acute edge of each superior rib, extending from the spine to near the junction of the ribs with their cartilages. The fibres run obliquely forwards and downwards, and are

Inserted into the upper obtuse edge of each inferior rib, from the spine to near the cartilage of the rib.

These muscles are seen on removing the muscles which cover the thorax.

The LEVATORES COSTARUM are twelve small muscles, situated on each side of the dorsal vertebræ. They are portions of the external intercostals. Each of these small muscles *arises* from the transverse process of one of the dorsal vertebræ, and passes downwards, to be *inserted* into the upper side of the rib next below the vertebra, near its tuberosity.

The first of these muscles passes from the last cervical vertebra, the eleven others from the eleven superior dorsal vertebræ. The three or four inferior Levatores are longer, and run down to the second rib

below the transverse process from which they arise. Hence Albinus names them the Levatores Costarum, Longiores et Breviores.

2. The INTERCOSTALES INTERNI—*Arise* from the inferior acute edge of each superior rib, beginning at the sternum, and extending as far as the angle of the rib. The fibres run obliquely downwards and backwards, and are

Inserted into the superior obtuse edge of each inferior rib from the sternum to the angle. Portions of the internal intercostals pass over one rib, and are inserted into the next below it.

Thus the intercostal muscles decussate, and are double on the sides of the thorax; but, from the spine to the angles of the ribs, there are only the external intercostals, and, from the cartilages to the sternum, only the internal, and some cellular membrane covering them. The whole of the internal intercostals, and the back part of the external, are lined by the pleura.

Use: To elevate the ribs, by causing them to approximate, and thus to enlarge the cavity of the thorax.

There is a pair of muscles situated on the inner surface of the sternum, viz:

The TRIANGULARIS STERNI, or Sterno-Costalis,—*Arises*, tendinous and fleshy, from the edge of the whole cartilago ensiformis, and from the edge of the lower half of the middle bone of the sternum. The fibres ascend obliquely upwards and outwards, and form a flat muscle, which is

Inserted, by three or four triangular fleshy and tendinous terminations, into the cartilages of the third, fourth, fifth, and sixth ribs.

This muscle lies on the inside of the ribs and sternum, and is lined by the pleura.

Use: To depress the cartilages and the bony extremities of the ribs, and consequently to assist in lessening the cavity of the thorax.

CHAPTER XIV.

DISSECTION OF THE MUSCLES SITUATED ON THE ANTERIOR PART OF THE NECK, CLOSE TO THE VERTEBRÆ.

FOUR pair of muscles are here situated.

1. The LONGUS COLLI—*Arises*, tendinous and fleshy, from the sides of the bodies of the three superior dorsal vertebræ, and from the anterior surface of the transverse processes of the four or five lower cervical vertebræ.

Inserted, tendinous and fleshy, into the fore part of the bodies of all the vertebræ of the neck.

This muscle lies behind the œsophagus, and the great vessels and nerves of the neck.

Use: To bend the neck forwards, and to one side.

2. The RECTUS CAPITIS INTERNUS MAJOR—*Arises*, tendinous and fleshy, from the anterior points of the transverse processes of the third, fourth, fifth, and sixth cervical vertebræ. It forms a considerable fleshy belly.

Inserted into the cuneiform process of the os occipitis a little before the condyloid process.

This muscle lies before the scaleni, and more outwardly than the longus colli, over part of which it passes.

Use: To bend the head forwards.

3. The RECTUS CAPITIS INTERNUS MINOR—*Arises*, fleshy, from the fore part of the body of the atlas, near its transverse process; and, ascending obliquely, is

Inserted near the root of the condyloid process of the occipital bone, under the last described muscle.

Use: to bend the head forwards.

4. The RECTUS CAPITIS LATERALIS—*Arises*, fleshy, from the anterior and upper part of the transverse process of the atlas.

Inserted, tendinous and fleshy, into a scabrous ridge of the os occipitis, which extends from the condyloid process of that bone towards the mastoid process.

It is situated immediately behind the internal jugular vein, where it comes out from the cranium.

Use: To pull the head a little to one side.

Besides these muscles, we meet also with

1. The SCALENUS ANTICUS—*Arises*, by three tendons, from the transverse processes of the fourth, fifth, and sixth vertebræ of the neck.

Inserted, tendinous and fleshy, into the upper edge of the first rib, near its cartilage.

2. The SCALENUS MEDIUS—*Arises*, tendinous, from the transverse processes of all the vertebræ of the neck.

Inserted into the upper and outer part of the first rib, from its root to within the distance of half an inch from the scalenus anticus.

The nerves to the superior extremity pass between this muscle and the former.

3. The SCALENUS POSTICUS—*Arises*, tendinous, from the transverse processes of the fifth and sixth vertebræ of the neck.

Inserted into the upper edge of the second rib, near the spine.

These muscles are covered before by the sternomastoideus and trapezius, behind by the trapezius and levator scapulæ; but the scaleni are so connected with the muscles of the spine, that the whole of them cannot be demonstrated till the muscles of the back and neck are dissected.

Use of these three muscles: To bend the neck to one side, and, when the muscles of both sides act, to bend it forwards; or, when the neck is fixed, to elevate the ribs, and dilate the chest.

We have given the description of the three parts, but it is proper to remark that some anatomists of eminence regard it as one triangular muscle.

CHAPTER XV.

DISSECTION OF THE SUPERIOR EXTREMITY.

SECTION. I.

OF THE SHOULDER AND ARM.

In the thigh we saw a strong fascia, arising from the neighbouring bones and ligaments, firmly investing the muscles, and giving origin to some of their fibres; but, on removing the integuments of the shoulder and arm, we meet with no regular fascia. The muscles, like those on the outside of the thorax, are covered by condensed cellular substance, which might be taken for a thin aponeurosis; but which is widely different in its nature, and ought to be regularly dissected off with the integuments.

There are ten muscles situated on the shoulder and the humerus.

1. The DELTOIDES—*Arises*, tendinous and fleshy, from the posterior third of the clavicle, from the whole edge of the acromion, and from the lower margin of

the whole spine of the scapula. From these several origins the fibres run in different directions, and con-verge. Those arising from the clavicle run outwards and downwards: those from the spine of the scapula outwards, forwards, and downwards; and those from the acromion directly downwards.

Inserted, tendinous, into a triangular rough surface on the outer side of the os humeri, near its middle.

This muscle is entirely superficial, except where the thin fibres of the platysma myoides arise from its anterior surface. It forms a strong coarse muscle, and covers the whole of the fore part and outside of the shoulder joint.

Use: To draw the arm directly upwards, and to move it a little forwards or backwards, according to the different directions of its fibres. Having reflected this muscle from the scapula and clavicle, you will expose more completely the muscles on the dorsum of the former bone. They fill up the posterior surface of the scapula, and are covered by a fascia, which adheres to the spine and edges of that bone. On dis-secting off this fascia, the fleshy fibres of the muscles will be found arising from its inner surface.

2. The Supra-Spinatus—*Arises*, fleshy, from all that part of the base of the scapula which is above its spine; from the superior costa as far forwards as the semilunar notch; from the spine itself, and from the concave surface betwixt it and the superior costa. The fleshy fibres, as they approach the neck of the scapula, terminate in a tendon which passes under the acromion, slides over the neck of the scapula (to which it is connected by loose cellular membrane,) adheres to the capsular ligament of the shoulder-joint, and is

Inserted into the anterior and superior part of the great tuberosity near the head of the os humeri.

Use: To raise the arm.

3. The Infra-Spinatus, *Arises*, principally fleshy,

from the lower part of the spine of the scapula as far back as the triangular flat surface; from the base of the bone below the spine to near the inferior angle; from the posterior ridge of the inferior costa; and from all the dorsum of the bone below the spine. The fibres ascend and descend towards a middle tendon, which runs forwards over the neck of the bone, and adheres to the capsular ligament.

Inserted, by a strong short tendon, into the middle part of the great tuberosity of the os humeri.

Use: To roll the humerus outwards, to assist in raising the arm, and in moving it outwards when raised.

4. The TERES MINOR—*Arises*, fleshy, from the inferior costa of the scapula, extending from the neck of the bone to within an inch or two of the inferior angle. It passes forwards along the inferior edge of the infra-spinatus, adheres to the capsular ligament of the shoulder-joint, and is

Inserted, tendinous and fleshy, into the lower and back part of the great tuberosity of the os humeri.

Use: To draw the humerus downwards and backwards, and to roll it outwards.

5. The TERES MAJOR—*Arises*, from an oblong, rough, flattened surface, at the inferior angle of the scapula. It forms a thick belly, which passes forwards and upwards towards the inside of the arm.

Inserted, by a broad thin tendon, into the ridge of the os humeri, at the inner side of the groove for lodging the tendon of the long head of the biceps flexor cubiti; its tendon is inserted along with the tendon of the latissimus dorsi.

Use: To roll the humerus inwards, and to draw it backwards and downwards.

6. The SUBSCAPULARIS—*Arises*, fleshy, from all the base of the scapula internally; from the superior and inferior costæ; and from the whole internal surface

of the bone. It consists of tendinous and fleshy bundles, which converge, slide over the inner surface of the neck of the scapula, pass in the hollow under the root of the coracoid process, and adhere to the inner part of the capsular ligament of the shoulder joint.

'Inserted, by a strong tendon, into the less tuberosity near the head of the os humeri.

The whole of this muscle is concealed by the scapula and muscles of the shoulder. It lies betwixt that bone and the serratus magnus.

Use: To roll the os humeri inwards, and to draw it to the side of the body.

7. The Biceps Flexor Cubiti—*Arises* by two heads. The first and outermost, called the Long Head, arises, by a strong tendon, from a smooth surface in the upper edge of the glenoid cavity of the scapula. It passes over the head of the os humeri, within the capsular ligament of the shoulder-joint, and enters a groove betwixt the two tuberosities of that bone. It forms a strong fleshy belly. The second and innermost, called the Short Head, arises, tendinous, from the lower part of the coracoid process of the scapula, in common with the coraco-brachialis, and sends off a fleshy belly.

These two fleshy bellies are at first only connected by condensed cellular membrane. They form a thick mass, and, below the middle of the arm, become inseparably united. They send off a strong tendon, which is at first broad, but soon becomes rounder, and passes over the fore part of the elbow-joint. It then slides over the cartilaginous middle surface of the tubercle at the upper end of the radius, and is

Inserted into the posterior and internal rough part of that tubercle; and by a lateral slip of fascia into the sheath of the fore arm.

The belly of the muscle is immediately under the

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integuments, and so is the tendon where it passes over the elbow-joint.

Use: To turn the hand supine, to bend the fore-arm on the arm, and the arm on the shoulder.

8. The CORACO BRACHIALIS—*Arises*, tendinous and fleshy, from the middle part of the apex of the coracoid process of the scapula. Its fibres, as it descends, also arise from the edge of the short tendon of the biceps flexor cubiti. It forms a flat fleshy belly which is always perforated by the nerve, named Musculo-Cutaneus.

Inserted, tendinous and fleshy, about the middle of the internal part of the os humeri, into a rough ridge.

Use: To move the arm upwards and forwards.

9. The BRACHIALIS INTERNUS—*Arises* from the middle of the os humeri, by two fleshy slips, which pass on each side of the insertion of the deltoid muscle; fleshy from all the fore part of the bone below, nearly as far as the condyles. The fibres converge, pass over the elbow-joint, and adhere to the capsular ligament.

Inserted, by a strong short tendon, into the rough surface immediately below the coronoid process of the ulna.

Use: To bend the fore-arm.

10. The TRICEPS EXTENSOR CUBITI is the great muscle which covers all the back part of the arm. It *arises* by three heads. The first, or long head, by a broad tendon, from the inferior costa of the scapula near its cervix; this forms a large belly, which covers the back part of the os humeri. The second, or short head, arises, on the outer and back part of the os humeri, from a ridge which runs from the back part of the great tuberosity towards the outer condyle. The third head, called BRACHIALIS EXTERNUS, arises by an acute beginning, from the inside of the os humeri above its middle, and from a ridge extending to the inner condyle.

The three heads unite above the middle of the os humeri, and invest the whole back part of the bone. They form a thick strong tendon, which is

Inserted into the Olecranon, and partly into the condyles of the os humeri, adhering firmly to the capsular ligament.

The tendon of the triceps sends off a thin fascia, which covers the triangular surface of the ulna, on which we commonly lean. Numerous fibres are also sent off to assist in forming the fascia of the fore-arm.

Use: To extend the fore-arm. The long head will also assist in drawing the arm backwards.

The ANCONEUS is a small triangular muscle, situated at the outer side of the olecranon, immediately under the integuments.

It *arises*, tendinous, from the posterior and lower part of the external condyle of the os humeri; forms a thick triangular fleshy mass, adhering to the capsular ligament of the elbow-joint, and is

Inserted into the concave surface on the outside of the olecranon, and into the posterior edge of the ulna.

This muscle lies betwixt the upper part of the extensor carpi ulnaris and the olecranon. It is partly covered by the tendon of the triceps extensor cubiti, and is enveloped in a fascia sent off from that tendon.

Use: To assist in extending the fore-arm.

SECTION II.

DISSECTION OF THE FASCIA AND MUSCLES SITUATED ON THE CUBIT OR FORE ARM.[*]

ON removing the integuments of the fore-arm, we find, as in the leg, a strong fascia investing all the

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[*] In the following description, the palm of the hand is supposed to be turned forwards, so that the radius and thumb are upon the outer side of the fore-arm, and the ulna and little finger upon its inner side.

muscles. This fascia is continued from the intermuscular ligaments which pass down to the condyles of the os humeri. It is attached to the condyles, and adheres firmly to the olecranon of the ulna. On the posterior part, it receives a great addition of fibres from the tendon of the triceps extensor; and on the fore-part of the arm, it appears to be a continuation of the aponeurosis which is sent off from the biceps flexor cubiti.

Above the fascia, we meet with several cutaneous veins and nerves.

The dissection of the fascia of the fore-arm is similar to that of the fascia of the leg. It is found firmly attached to the fibres of the muscles, so that the exposed surface appears ragged. Between the muscles it sends down Ligaments called Intermuscular, which connect the muscles, and give origin to many of their fibres.

General Observations.—In dissecting the fore-arm, you will not expect to find each muscle separate from the contiguous ones, as far as its very origin from the bones. The partitions of fascia unite them most firmly to a considerable distance from their commencement; and these connections should not be disturbed, since they are as justly to be regarded in the light of origins of the muscles, as the attachments which the fibres have to the bone. The muscles are divided into two masses; of which one lies over the radius and back of the fore-arm, and contains the supinators and extensors: the other, situated over the ulna, and inner side of the fore-arm, consists of the pronators and flexors. Although some muscles in each of these masses arise quite separately, others are joined into a common tendinous and fleshy origin, in the manner just described. First then, clean all the muscles as they lie; and after observing them in their relative position, reflect each muscle, beginning with the superficial ones, and read its description at the same time.

The student may perhaps remember the muscles more readily, by arranging them in classes of three each; thus:

For the motion of the wrist, *three flexors*, the ulnaris, radialis, and medius, commonly called palmaris longus. *Three extensors*, ulnaris, radialis longior, and brevior. *Three pronators*, the teres, quadratus, and the mass of flexor muscles. *Three supinators*, the supinator longus, brevis, and biceps cubiti. There are *three extensors of the fingers*, extensor communis digitorum, extensor primi digiti, extensor minimi digiti. *Three extensors of the thumb*, extensor primus, secundus, and tertius. *Three flexors of the fingers and thumb*, flexor digitorum sublimis, flexor digitorum profundus, flexor pollicis longus.

MUSCLES SITUATED ON THE FORE PART OF THE CUBIT, AND ARISING FROM THE INNER CONDYLE OF THE OS HUMERI.

These are eight in number, and may be divided into two classes: the superficial, and the deep-seated.

First, the superficial.

All the muscles passing from the inner condyle may be said to arise by one common tendinous head; but they will be here described as arising distinct from the condyle. It must, however, be recollected, that their origins are intimately connected by intermuscular ligaments, and that they cannot be separated without dividing some of their fibres.

1. The PRONATOR RADII TERES—*Arises*, tendinous and fleshy, from the anterior surface of the inner condyle of the os humeri, and from the coronoid process of the ulna, and the fascia of the fore arm. The fibres pass outwards, run by the side of the tubercle of the radius, and pass over the outer edge of that bone, to be

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Inserted, tendinous and fleshy, into a rough surface on the back part of the radius about its middle.

Its tendon, to arrive at its place of insertion, passes under the belly of the supinator longus, and, when that muscle is removed, will be found inserted into the radius immediately below the supinator brevis.

Use: To roll the radius, together with the hand, inwards.

2. The FLEXOR CARPI RADIALIS—*Arises,* from the lower and fore part of the internal condyle of the os humeri; fleshy from the fascia and intermuscular ligaments, and from the upper end of the ulna. It forms a thick belly, which runs down the fore arm, and terminates in a flat tendon. This tendon passes under the annular ligament* of the wrist, runs through a groove in the os trapezium, and is

Inserted into the fore part of the base of the meta-carpal bone sustaining the fore finger.

Its insertion cannot be seen till the palm of the hand is dissected, where it will be found concealed by the muscles of the ball of the thumb.

Use: To bend the hand, and to assist in its prona-tion.

3. The PALMARIS LONGUS—*Arises,* by a slender tendon, from the fore part of the inner condyle of the os humeri; and fleshy, from the intermuscular liga-ments; it forms a short fleshy belly, which soon sends off a long slender tendon. This tendon descends along the fore arm, and is

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* The annular ligament of the wrist consists of two parts. 1. The ligamentum carpi transversale externum passes from the styloid process of the ulna and os pisiforme, transversely, over the back of the wrist, and spreads out broad, to be affixed to the styloid process of the radius. Under it pass the tendons of the extensor muscles. 2. The ligamentum carpi transversale internum is a strong ligament, which passes across the fore part of the wrist. It arises from the os pisiforme and os unciforme on the inner edge of the wrist, and is attached to the os scaphoides and os trapezium on the outer edge. Under it pass the tendons of the flexor muscles.

Inserted, near the root of the thumb, into the annular ligament of the wrist, and into a tendinous membrane that covers the palm of the hand, named Fascia, or Aponeurosis Palmaris.

It arises betwixt the flexor carpi radialis and flexor ulnaris. Its tendon descends between these two muscles, and above the fibres of the flexor digitorum sublimis. This muscle is sometimes wanting.

Use: To bend the hand, and to stretch the palmar aponeurosis.

4. The FLEXOR CARPI ULNARIS—*Arises*, from the inferior part of the internal condyle of the os humeri; tendinous and fleshy, from the inner side of the olecranon, and by a tendinous expansion from the posterior ridge* of the ulna, to nearly the lower end of the bone; and from the intermuscular ligaments and fascia of the fore-arm. The fibres pass obliquely forwards into a tendon which runs over the fore-part of the ulna, and is

Inserted into the os pisiforme, and sometimes sends its fibres over a small ligament which goes to the base of the metacarpal bone of the little finger.

The tendon is bound down by a thin aponeurotic slip, which passes from the inner part of the annular ligament of the wrist.

Use: To bend the hand.

5. The FLEXOR SUBLIMIS PERFORATUS—*Arises*, tendinous and fleshy; from the under part of the internal condyle of the os humeri; tendinous, from the lower part of the coronoid process of the ulna; fleshy, from the tubercle of the radius, from the middle of the fore part of that bone, and from the middle third of its outer edge. These origins form a strong fleshy mass, which sends off four tendons. The tendons are connected by cellular membrane, and pass together

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* The ridge which leads to the styloid process.

under the annular ligament of the wrist; after which they separate, become thinner and flatter, pass along the metacarpal bone and first phalanx of each of the fingers, and are

Inserted into the anterior and upper part of the second phalanx, each tendon being, near the extremity of the first phalanx, divided for the passage of a tendon of the flexor profundus.

To expose the origin of this muscle, the bellies of the pronator teres, flexor carpi radialis, and palmaris longus, must be detached from the condyle.

Its tendons will be seen in the dissection of the palm of the hand.

Use: To bend the second joint or phalanx of the fingers.

By removing the belly of the flexor sublimis, we expose the deep seated muscles.

6. The FLEXOR PROFUNDUS PERFORANS—*Arises*, fleshy, from the smooth concavity on the inside of the ulna, between the coronoid process and the olecranon; from the smooth flat surface of the ulna, betwixt its posterior and internal angles; from the under part of the coronoid process; from the fore part of the ulna below that process, and from the inner half of the interosseous ligament. This muscle forms a thick mass, which descends along the fore part of the ulna, adhering to that bone as low as one-third of its length from its inferior extremity, and terminates in sending off four tendons. These tendons are flat, pass together under the annular ligament of the wrist, run through the slits in the tendons of the flexor sublimis, and are

Inserted into the fore and upper part of the third or last phalanx of all the fingers.

Use: To bend the last joint of the fingers.

7. FLEXOR LONGUS POLLICIS MANUS—*Arises*, from the upper and fore part of the radius, immediately below its tubercle, fleshy, from the outer edge

and anterior surface of that bone as low as two inches above its inferior extremity, and from the outer part of the interosseous ligament. It has also generally a tendinous origin from the internal condyle of the os humeri. The tendon of the muscle passes under the annular ligament of the wrist, and is

Inserted into the last bone of the thumb.

Use: To bend the last joint of the thumb.

On separating the lower part of the two last described muscles, we expose a small square muscle, passing transversely just above the wrist, and lying close to the bones.

8. The PRONATOR QUADRATUS—*Arises*, broad, tendinous, and fleshy, from the inner edge of the ulna, extending from the lower extremity of the bone two inches up its edge. The fibres run transversely, adhere to the interosseous ligament, and are

Inserted into the lower and anterior part of the radius.

Use: To turn the radius, together with the hand, inwards.

MUSCLES SITUATED ON THE OUTER AND BACK PART OF THE FORE-ARM, AND ARISING FROM THE OUTER CONDYLE OF THE OS HUMERI.

These muscles are eleven in number, and may be divided into two classes: the superficial, and the deep seated.

THE SUPERFICIAL.

The muscles which arise from the outer condyle are much more distinct in their origins than those from the inner. Several of them arise a considerable way up the os humeri; but there is here also a common tendinous origin, from which the extensor carpi radialis brevior, extensor digitorum communis, and exten-

sor carpi radialis, proceed; so that these muscles are intimately connected.

1. SUPINATOR RADII LONGUS—*Arises*, tendinous and fleshy, from the external ridge of the os humeri, nearly as far up as the middle of the bone, and ceases to adhere about two inches above the condyle. It forms a thick fleshy belly, which passes over the side of the elbow-joint, becomes smaller, and terminates above the middle of the fore-arm in a flat tendon. The tendon becomes gradually rounder, and is

Inserted into the lower end of the radius on its outer side.

This muscle is situated immediately under the integuments along the outer edge of the arm and fore-arm; and its insertion is crossed by the extensors of the thumb.

Use: To roll the radius outwards, and turn the palm of the hand upwards; also to bend the fore-arm on the humerus.

2. The EXTENSOR CARPI RADIALIS LONGIOR— *Arises*, tendinous and fleshy, from the external ridge of the os humeri, beginning immediately below the origin of the supinator longus, and continuing to arise as far as the upper part of the outer condyle. It forms a thick short belly, which passes over the side of the elbow-joint, and terminates above the middle of the radius in a flat tendon. This tendon runs along the radius, and, becoming rounder, passes through a groove in the back part of the inferior extremity of that bone, to be

Inserted into the posterior and upper part of the metacarpal bone of the fore-finger.

Use: To extend the wrist, and move the hand backwards, and to assist in bending the fore arm.

3. The EXTENSOR CARPI RADIALIS BREVIOR— *Arises*, tendinous, from the under and back part of the external condyle of the os humeri, and from the

external lateral ligament of the elbow-joint. Its thick belly runs along the outside of the radius, and terminates in a tendon, which passes through the same groove in the radius as the extensor radialis longior, and under the annular ligament.

Inserted, by a round tendon, into the upper and back part of the metacarpal bone that supports the middle finger.

Use: To extend the hand.

4. The EXTENSOR DIGITORUM COMMUNIS --*Arises*, tendinous, from the under part of the external condyle of the os humeri; fleshy, from the intermuscular ligaments which connect it to the extensor carpi radialis brevior before, and the extensor carpi ulnaris behind, and from the inner surface of the fascia. It descends along the back part of the fore-arm, and adheres to the ulna where it passes over it. The fleshy belly terminates in four flat tendons, which pass under the annular ligament in a depression on the back part of the radius, and are

Inserted into the posterior part of all the bones of the fingers by a tendinous expansion.

The tendons are connected on the back of the metacarpal bone by cross slips. The inner part of this muscle is sometimes described as a separate muscle, and is called Extensor Proprius Minimi Digiti, vel Auricularis. It passes through a separate depression of the radius, and a particular ring of the annular ligament.

Use: To extend all the joints of the fingers.

The posterior surface of each finger is covered with a tendinous expansion which is formed by the tendons of the common extensor, of the lumbricales, and interossei. This tendinous expansion terminates in the third or extreme phalanx.

5. The EXTENSOR CARPI ULNARIS—*Arises*, tendinous, from the under part of the external condyle;

fleshy, from the intermuscular ligaments and inside of the fascia. It crosses towards the ulna, and arises, fleshy, from the back part of that bone. It terminates in a strong tendon, which passes through a groove in the back part of the lower end of the ulna, under the annular ligament, and is

Inserted into the posterior and upper part of the metacarpal bone of the little finger.

This muscle is entirely superficial, and serves to extend the wrist, and bring the hand backwards; but chiefly to bend the hand laterally towards the ulna. The next muscle would be the anconeus, but that has been already described.

By removing the superficial muscles, we expose

THE DEEP SEATED.

6. The Supinator Radii Brevis—*Arises*, tendinous, from the lower part of the external condyle of the os humeri; from the outer surface of the ulna; and from the interosseous ligament: it passes outwards round the upper part of the radius, and is

Inserted into the upper and outer edge of the tubercle of the radius, and into an oblique ridge extending from the tubercle downwards and outwards to the insertion of the pronator teres.

This muscle nearly surrounds the upper and outer part of the radius.

Use: To roll the radius outwards, and bring the hand supine.

On the back part of the fore arm we meet with three muscles going to the thumb, and one to the fore finger.

7. The Extensor Ossis Metacarpi Pollicis— *Arises*, fleshy, from the middle and posterior part of the ulna, immediately below the termination of the anconeus, from the interosseous ligament, and from

the posterior surface of the radius below the insertion of the supinator radii brevis. The fleshy fibres terminate in a tendon which passes through a groove in the outer edge of the lower extremity of the radius:

Inserted, generally by two tendons, into the os trapezium, and into the upper and back part of the metacarpal bone of the thumb.

Use: To extend the metacarpal bone of the thumb outwardly.

8. The EXTENSOR PRIMI INTERNODII POLLICIS MANUS—*Arises*, fleshy, from the back part of the ulna below its middle, from the interosseous ligament and radius. It runs along the lower edge of the extensor ossis metacarpi, and forms a tendon, which passes through the same groove as the tendon of that muscle, and is

Inserted into the posterior part of the first bone of the thumb. Part of the tendon is also continued into the base of the second or extreme phalanx.

Use: To extend the first phalanx of the thumb obliquely outwards.

It is called also Extensor secundi internodii.

9. The EXTENSOR SECUNDI INTERNODII POLLICIS MANUS—*Arises*, tendinous and fleshy, from the posterior surface of the ulna above its middle, and from the interosseous ligament. Its belly partly covers the origins of the two other extensors of the thumb, and terminates in a tendon, which runs through a distinct groove in the back part of the radius, and is

Inserted into the posterior and upper part of the second or extreme phalanx of the thumb.

Use: To extend the last joint of the thumb obliquely backwards.

It is called also Extensor tertii internodii.

10. The INDICATOR, or Extensor Primi Digiti— *Arises*, by an acute fleshy beginning, from the middle
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of the back part of the ulna, and from the interosseous
ligament. Its tendon passes through the same sheath
of the annular ligament with the extensor digitorum
communis, and is

Inserted into the posterior part of the fore finger
with the tendon of the common extensor.

Use: To assist in extending the fore finger.

SECTION III.

DISSECTION OF THE PALM OF THE HAND.

THE tendons which pass over the bones of the car-
pus into the palm of the hand are firmly bound down
by the annular ligament of the wrist. They are in-
vested and connected by cellular membrane, which
forms sheaths, and secretes synovia to facilitate their
motions.

In the sole of the foot we saw a strong fascia sup-
porting and covering the muscles, and passing from
the heel to the toes. On removing the integuments
from the palm of the hand, we meet with a similar
fascia. It arises from the tendon of the palmaris longus,
and from the annular ligament of the wrist, expands
over all the palm of the hand, and is fixed to the roots
of the fingers, splitting, to transmit their tendons. This
is the Fascia or Aponeurosis Palmaris. It is triangular.
Where it arises from the wrist, it is narrow, and does
not cover the bases of the metacarpal bones of the little
and fore-finger. As it runs over the hand, it becomes
broader, and is fixed by a bifurcated extremity in the
lower end of each of the metacarpal bones of the four
fingers. The palmar fascia is strong and thick, con-

ceals and supports the muscles of the hand, and may be distinguished into four portions, which are connected by transverse fibres, while other fibres pass from them downwards, adhere strongly to the edges of the metacarpal bones, and separate the tendons of each finger.

There is a small thin cutaneous muscle situated between the wrist and the little finger.

The PALMARIS BREVIS—*Arises* from the annular ligament of the wrist, and from the inner edge of the fascia palmaris.

Inserted, by small scattered fibres, into the skin and fat which covers the short muscles of the little finger and inner edge of the hand.

Use: To assist in contracting the palm of the hand.

The fascia palmaris may now be removed. Under it will be seen the four tendons of the flexor sublimis perforatus. They are seen coming from beneath the annular ligament of the wrist, and diverging as they pass towards their respective fingers. Each tendon splits at the extremity of the first phalanx, for the passage of the tendon of the flexor profundus perforatus, and is inserted into the base of the second phalanx.

Under the flexor sublimis are the four tendons of the flexor profundus perforans, which pass through the slits in the tendons of the former, and are inserted into the bases of the third phalanges of the fingers.

The LUMBRICALES are four small muscles, which *arise*, from the outer side of the tendons of the flexor profundus perforans. The tendon of each muscle runs along the outer edge of the finger, and is

Inserted into the tendinous expansion which covers the back part of the phalanges of the fingers, about the middle of the first joint.

Use: To bend the first phalanges of the fingers, the

flexor profundus being previously in action, to afford them a fixed point.

The short muscles of the thumb and fore-finger are five in number.

1. The ABDUCTOR POLLICIS MANUS—*Arises*, from the anterior surface of the annular ligament of the wrist, and the os naviculare and os trapezium.

Inserted, into the root of the second bone of the thumb, and the tendinous membrane covering the back part of all the phalanges.

This muscle is situated immediately under the integuments, and is the outermost portion of the muscular mass forming the ball of the thumb.

Use: To draw the thumb from the fingers.

2. The FLEXOR OSSIS METACARPI POLLICIS, or Opponens Pollicis—*Arises*, under the last, from the annular ligament of the wrist, and the os naviculare and os trapezium.

Inserted, into the anterior and lower part of the metacarpal bone of the thumb.

Use: To bring the first bone of the thumb inwards.

3. The FLEXOR BREVIS POLLICIS MANUS arises by two distinct heads, (formed by the tendon of the long flexor,) from the inside of the annular ligament; from the anterior surface of the os trapezium and os trapezoides; from the root of the metacarpal bone of the fore finger; and from the upper part of the os magnum and os unciforme.

Inserted into the sesamoid bones, and the first phalanx of the thumb.

This muscle is in great part concealed by the abductor pollicis.

Use: To bend the first joint of the thumb.

4. The ADDUCTOR POLLICIS MANUS—*Arises*, fleshy, from almost the whole length of the metacarpal bone of the middle finger.

Inserted, into the first phalanx of the thumb, at its carpal extremity.

Use: To pull the thumb towards the fingers.

5. The ABDUCTOR INDICIS MANUS—*Arises,* from the os trapezium, and the metacarpal bone of the thumb, and is

Inserted, into the first phalanx of the fore finger.

This muscle is seen most distinctly on the back of the hand. It is there superficial, and is crossed by the tendon of the extensor secundi internodii pollicis. In the palm of the hand it is concealed by the muscles of the ball of the thumb.

Use: To move the fore finger towards the thumb, or the thumb towards the fore finger.

The insertion of the flexor carpi radialis is exposed by removing the muscles of the thumb.

The short muscles of the little finger are three in number.

1. The ABDUCTOR MINIMI DIGITI MANUS—*Arises,* from the os pisiforme, and adjacent part of the annular ligament of the wrist.

Inserted, into the side of the first phalanx, and the tendinous expansion which covers the back part of the little finger.

Use: To draw the little finger from the rest.

2. The FLEXOR PARVUS MINIMI DIGITI—*Arises,* fleshy, from the outer side of the os unciforme, and from the annular ligament of the wrist, where it is affixed to that bone.

Inserted, by a roundish tendon, into the base of the first phalanx of the little finger.

Use: To bend the little finger, and bring it towards the other fingers.

3. ADDUCTOR METACARPI MINIMI DIGITI MANUS, *Arises,* from the os unciforme, and adjacent part of the annular ligament of the wrist.

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Inserted, into the fore part of the metacarpal bone of the little finger, nearly its whole length.

It is concealed by the bellies of the abductor and flexor brevis minimi digiti.

Use: To bend and bring the metacarpal bone of the little finger towards the rest.

The INTEROSSEI are small muscles situated between the metacarpal bones, and extending from the bones of the carpus to the fingers. They are exposed by removing the other muscles of the thumb and fingers.

The INTEROSSEI INTERNI are seen in the palm of the hand, and are four in number. They arise, tendinous and fleshy, from the base and sides of the metacarpal bones, and are inserted into the side of the first phalanx of the fingers, and into the tendinous expansion which covers the posterior surface of all the phalanges.

1. The First, named Prior Indicis, *arises* from the outer part of the metacarpal bone of the fore-finger; and is *inserted* into the outer side of the first phalanx of that finger.

Use: To draw the fore-finger towards the thumb.

2. The Second, named Posterior Indicis, *arises* from the root and inner side of the metacarpal bone of the fore-finger; and is *inserted* into the inner side of the first phalanx of the fore-finger.

Use: To draw that finger outwards.

3. The Third, named Prior Annularis, *arises* from the root and outer side of the metacarpal bone of the ring-finger; and is *inserted* into the outer side of the first phalanx of the same finger.

Use: To pull the ring-finger towards the thumb.

4. The Fourth, named Interosseus Auricularis, *arises* from the root and outer side of the metacarpal bone of the little finger; and is *inserted* into the outer side of the first phalanx of the little finger.

Use: To draw the little finger outwards.

The internal interossei also assist in extending the fingers obliquely.

The INTEROSSEI EXTERNI, seu Bicipites, are three in number. They are larger than the internal, and are situated between the metacarpal bones on the back of the hand.   Each of these muscles *arises* by a double head, from two metacarpal bones, and is *inserted* into the side of one of the fingers, and into the tendinous expansion which covers the posterior part of the phalanges.

1. The First, named Prior Medii, *arises* from the roots of the metacarpal bones of the fore and middle fingers; and is *inserted* into the outer side of the middle finger.

Use: To draw the middle finger towards the thumb.

2. The Second, named Posterior Medii, *arises* from the roots of the metacarpal bones of the middle and ring fingers; and is *inserted* into the inner side of the middle finger.
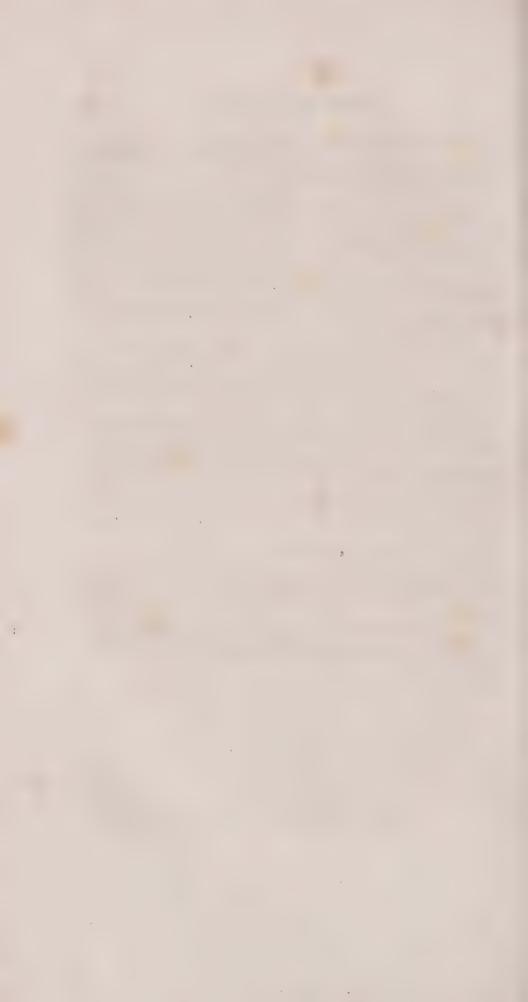
Use: To draw the middle finger towards the ring-finger.

3. The Third, named Posterior Annularis, *arises* from the roots of the metacarpal bones of the ring and little fingers; and is *inserted* into the inner side of the ring-finger.

Use: To draw the ring-finger inwards.   The external interossei also extend the fingers.

PART II.

DISSECTION OF THE VASCULAR AND NERVOUS SYSTEMS.

WE will suppose that the subject has been injected; and that the student proceeds to the examination of the lower extremity. He may proceed according to the rules laid down for the dissection of the abdominal muscles, and having carefully raised the external oblique he will meet in the region of the abdominal ring the epigastric artery, and the circumflexa ilii, branches of the external iliac artery.

The *Epigastric Artery* comes off from the inside of the external iliac, crosses the external iliac vein, passes obliquely upwards and inwards, under Poupart's ligament, to which it is but loosely connected, and runs behind the upper extremity of the abdominal ring and spermatic chord, to reach the rectus abdominis. At first it is situated between the posterior surface of that muscle and the peritoneum, but higher up between the muscular fibres and the sheath. It terminates in ramifications, which supply the rectus, and which inosculate with those of the mammaria interna, sent down from the thorax on each side of the sternum.

The *circumflexa Ilii* is sent off from the outside of the external iliac, passes upwards and outwards, runs along the inside of Poupart's ligament, till it arrives at the anterior superior spinous process of the os ilium; thence it is continued along the inside of the

spine of the ilium, lying close upon the bone between
the transversalis abdominis and the upper edge of the
iliacus internus, to both of which it gives twigs, and
ends in inosculating with the ileo-lumbar artery. The
muscles of the abdomen may now be removed; and
having cut through the peritoneum, the student will
meet with the abdominal aorta and its various branches.

OF THE VESSELS AND NERVES SITUATED BEHIND THE PERITONEUM.

1. THE ARTERIES, VIZ: THE AORTA ABDOMINALIS, AND ITS BRANCHES.

THE Aorta passes from the thorax into the abdo-
men, between the crura of the diaphragm, close upon
the spine. It then descends on the fore part of the
vertebræ, lying not exactly in the middle, but rather
inclined to the left side. On the fourth lumbar ver-
tebra, it bifurcates into the two primitive or common
iliac arteries.

BRANCHES OF THE ABDOMINAL AORTA.

1. The two PHRENIC Arteries arise from the Aorta,
before it has fairly entered into the abdomen, and
ramify over the diaphragm;—sometimes they come off
in one trunk, which bifurcates; sometimes one of
them arises from the cœliac.

2. The CŒLIAC Artery comes off at the point where
the aorta has fairly extricated itself from the dia-
phragm; it is a single, large, but short trunk, situated
between the inferior surface of the liver, and the small
curvature of the stomach, and surrounded by the
meshes of the semilunar ganglion. It divides at once

into three branches; and as they depart in different directions from one point, as from a centre, the trunk is called the Axis Arteriæ Cœliacæ.

(1.) A. Coronaria Ventriculi, the middle branch, is the smallest of the three; it passes from the axis towards the left side, and arriving at the cardiac orifice of the stomach, where it attaches itself to that organ, sends a branch round the cardia, named *Ramus Coronariæ Dexter.* The trunk itself is then continued along the lesser curvature from left to right, to inosculate with the pylorica or coronaria dextra: it sends off branches to the little epiploon, &c. It sometimes terminates in the liver, entering at the portæ, and then it is the largest of the branches of the cœliac. In this case, the trunk, after ascending towards the left to reach the cardia, is reflected to the right, in its way to the liver; and, at the point of reflection, gives off the *coron. ventric.*

(2.) Arteria Splenica, leaving the trunk of the cœliac, goes directly to the side, passes under the stomach, and along the upper border of the pancreas, running in a tortuous and serpentine course: it enters the left concave surface of the spleen in several branches, but before doing so, it gives off the following branches:

a, Pancreatice Parvæ to the pancreas, where it runs along the border of that viscus.

b, Vasa Brevia to the bulging extremity of the stomach.

c, A. Gastro-epiploica Sinistra, which runs along the greater curvature of the stomach, inosculating with the gastro-epiploica dextra.

(3.) Arteria Hepatica runs in a direction opposite to the splenic, towards the right side; but not more than half of its blood goes to the liver: It sends off the following branches:

a, Pylorica, or Coronaria Dextra, sometimes

comes off from the trunk of the hepatic, sometimes from one of its branches:—reaching the pyloric end of the stomach, it sends its ramifications along the lesser curvature, to inosculate with the proper coronary artery.

b, GASTRO-EPIPLOICA DEXTRA, or GASTRO-DUO-DENALIS, passes under the pylorus, to reach the great curvature of the stomach, along which it runs, inosculating with the gastro-epiploica sinistra, and sending branches upwards to the stomach, and downwards to the omentum; it also supplies the upper part of the duodenum, and sends off a considerable branch to the right extremity of the pancreas.

The hepatic artery then divides into the right and left hepatic. The RIGHT is distributed to the right lobe of the liver, and to the gall-bladder. The LEFT supplies the whole of the left lobe, the lobulus Spigelii, and part of the right lobe of the liver.

3. The SUPERIOR MESENTERIC ARTERY is a single trunk; it leaves the aorta about half an inch lower than the cœliac artery, it comes out from under the mesocolon, and stretches over the duodenum: it enters the fold of peritoneum forming the mesentery, and runs down in this, gradually incurvating from the left to the right side.

From the right side or concavity of this arch, three branches are given to the colon.

(1.) A. ILEO-COLICA runs down to the caput coli and last turns of the ileon; its branches upon the small intestines inosculate with those branches of the superior mesenteric distributed to the small intestines in general; and on the great intestine, it inosculates with the next branch.

(2.) A. COLICA DEXTRA.—This artery runs from the root of the superior mesenteric artery, across towards the right side of the colon, where that intestine begins to rise over the kidney.

(3.) A. COLICA MEDIA.—This branch goes directly upwards from the trunk of the superior mesenteric, as it comes out from under the mesocolon. After running a little way upon the mesocolon, it divides; and the division going towards the right side, makes a large inosculation with the colica dextra, while the left branch makes an opposite sweep, and joins the colica sinistra, which is a branch of the inferior mesenteric.

Often there are only two branches instead of these three; viz. *ileo-colica*, and *colica dextra*; then the *c. media* is a branch of the latter. Frequently too, there is only *one* branch, called *colica dextra*, and dividing after its origin, into the three above named.

The left side or convexity of the arch of the superior mesenteric sends off from sixteen to twenty branches, which, after forming frequent anastomoses and arches, proceed to the small intestines.

4. The RENAL or EMULGENT ARTERIES are two in number. Each artery arising, below the superior mesenteric, from the side of the aorta, passes to the kidney, and after having given twigs to the renal capsule, and adipose membrane, enters the smaller arch of the kidney. The right artery is longer than the left, and passes behind the vena cava ascendens.

5. The SPERMATIC ARTERIES are also two; they come off about an inch below the emulgent from the fore part of the aorta. Each artery descends behind the peritoneum, giving twigs to the parts in its course, and accompanied by the spermatic vein and nerves. It then passes through the abdominal ring, and enters the upper part of the testicle in five or six branches. In the female it supplies the ovaria and fundus uteri.

6. The INFERIOR MESENTERIC is a single trunk, which comes off rather from the left side of the aorta, below the spermatic arteries; it passes in the mesentery

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to the left side of the abdomen, where it divides as follows:

(1.) The COLICA SINISTRA, an artery which ascends along the left side of the colon, to inosculate with the A. Colica Media.

(2.) Branches which pass to the sigmoid flexure.

(3.) The great trunk of the artery runs down behind the rectum, on which it ramifies largely, and is termed ART. HEMORRHOIDALIS INTERNA.

7. The LUMBAR ARTERIES are five or six small arteries on each side, which arise from the back part of the aorta, and are distributed to the spinal canal, peritoneum, muscles of the spine, and of the sides of the abdomen and pelvis. They inosculate with the A. Epigastrica, Circumflexa ilii &c.

8. A. SACRA MEDIA is a single artery, arises from the back part of the aorta at its bifurcation, and descends along the anterior surface of the sacrum, giving twigs to all the neighboring parts.

At the fourth lumbar vertebra, the aorta bifurcates into the two primitive or common iliacs.

The ILIACA COMMUNIS runs along the edge of the psoas muscle, and at an inch or two from its origin divides into,

(1.) The Internal Iliac, which passes down into the pelvis.

(2.) The External Iliac, which, following the direction of the psoas muscle, passes under Poupart's ligament, and becomes the inguinal artery.

2. VEINS.

The VENA CAVA ABDOMINALIS, vel Inferior, is formed by the junction of the two common iliac veins; it passes up through the abdomen on the lumbar vertebræ, and on the right side of the aorta.

In this course it receives the following veins, which resemble their corresponding arteries.

1. The Lumbar Veins.

2. The Emulgent or Renal Veins;—the left is the longer, as it crosses over the fore part of the aorta.

3. The Right Spermatic Vein;—the left enters the left renal vein.

The vena cava then passes through the fissure of the liver, being nearly surrounded by that viscus, and receiving three branches from it, called the VENÆ HEPATICÆ. It then perforates the diaphragm, and enters the thorax.

The common iliac vein of each side is formed by the union of two branches, the EXTERNAL and INTERNAL ILIAC VEINS, which accompany the arteries of the same name:—The common iliac vein of each side lies on the inside of its artery; hence both veins cross behind the right iliac artery, to unite and form the vena cava, on the fore part of the lumbar vertebræ.*

The SUPERIOR MESENTERIC VEIN, the INFERIOR MESENTERIC VEIN, and the SPLENIC VEIN, do not join the cava, but are united behind the pancreas, to form the Vena Portæ. This vein ramifies anew through the liver, and its blood is returned into the vena cava by the venæ cavæ hepaticæ.

Although the trunks just enumerated are the chief veins that contribute to form the vena portæ, yet the returning veins of all the viscera enclosed in the peritoneum, except the liver, are included in the same system, and join one or other of the large trunks. This is the case with the stomach, pancreas, gall-bladder,

* It may be here proper to observe, that generally a great vein accompanies every great artery; but when the ramifications become small, each artery is attended by two veins.

and omentum.   The blood which goes to the spleen, large and small intestines, is all returned by the three great trunks.

3. NERVES.

1. The eighth pair, or Par Vagum, descending on each side of the œsophagus through the diaphragm, forms the two STOMACHIC PLEXUSES on the anterior and posterior surfaces of the stomach. These plexuses send some branches to the cœliac, to the hepatic, and to the splenic plexus.

2. The SPLANCHNIC NERVE, or Anterior Intercostal, a branch sent off by the intercostal nerve in the thorax, enters the abdomen betwixt the crura of the diaphragm; here each nerve forms a SEMILUNAR GANGLION by the side of the cœliac artery.

From this ganglion, on each side, branches are sent across, which communicate intimately together, and form round the root of the cœliac artery, a very intimate plexus, containing several ganglia of various sizes, formerly called the SOLAR, but now more correctly the CŒLIAC PLEXUS.   Nerves pass from this plexus, with the branches of the aorta, to the various viscera of the abdomen: in a common dissection these nerves cannot be clearly demonstrated, as they lie very close on the respective arteries, and are surrounded by much condensed cellular substance; they form the hepatic, splenic, superior, and inferior mesenteric, renal, and spermatic plexuses.

3. The trunk of the intercostal nerve, the *posterior* intercostal, perforates the small muscle of the diaphragm close to the spine, runs down on the sides of the lumbar vertebræ, and along the upper edge of the psoas magnus.   It terminates on the extremity of the os coccygis, by union with the nerve of the opposite side, in a ganglion named GANGLION IMPAR.   In this

course, it communicates with the lumbar nerves, and the various abdominal plexuses.

The THORACIC DUCT may be seen passing from the abdomen into the thorax, between the aorta and the right crus of the diaphragm. It is larger here than in its subsequent course, and the dilated portion is called *receptaculum chyli*, as the lacteals pour in the chyle in this situation.

OF THE VESSELS AND NERVES CONTAINED WITHIN THE PELVIS.

1. ARTERIES.

THE A. ILIACA INTERNA, having left the trunk of the iliaca communis, passes immediately into the pelvis, where it gives off several large arteries.

1. A. ILEO-LUMBALIS supplies the psoas and iliacus internus muscles.

2. A. SACRÆ LATERALES, two or three small vessels which supply the sacrum, cauda equina, and neighboring parts.

3. A. GLUTEA (or *iliaca posterior*,) a very large branch, passes out of the pelvis through the upper part of the sciatic notch to supply the haunch, but, in its passage, it gives some branches to the os sacrum, os coccygis, the rectum, and the muscles situated within the pelvis.

4. A. SCIATICA passes out of the pelvis by the sciatic notch, and below the pyriformis muscle to supply the hip: in its passage it gives branches to the neighboring parts.

5. A. PUDICA (*pudenda communis* or *interna*) is the branch of the internal iliac, which is more immediately destined to supply the parts of generation, perineum, and lower part of the rectum: it goes out of the pelvis

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above the superior sacro-sciatic ligament, twists round it, and re-enters the pelvis above and before the inferior sacro-sciatic ligament; it then descends on the inside of the tuber ischii, ascends on the inner surface of the rami of the ischium and pubis, and, reaching the root of the penis, divides into two branches.

(1.) A. PERINEI, a branch which, after giving twigs to the bulb of the urethra and neighboring muscles, enters the crus of the penis, and subdivides into branches which pass to both extremities of the crus.

(2.) A. DORSALIS PENIS, passes under the arch of the pubis, runs along the dorsum penis, and is distributed to the integuments.

In its course the pudic artery gives off many branches.

(1.) While in the pelvis, it gives twigs to the bladder, prostate gland, and rectum.

(2.) A. HÆMORRHOIDALES EXTERNÆ come from the pudic while passing by the anus.

(3.) A. TRANSVERSA PERINEI, following the course of the transversus perinei muscle.

(6.) A. OBTURATRIX descends on the inside of the psoas muscle, passes through the foramen in the obturator ligament to the muscles on the inside of the thigh.

(7.) A. HYPOGASTRICA, which in the fœtus sends off the umbilical artery, is in the adult continued only to the side of the bladder, to which it gives branches; in the female, it enters the neck of the uterus, and gives branches to the vagina.

You must not expect to meet with uniformity in the distribution of these vessels in all subjects: sometimes the gluteal and pudic arteries come off by one trunk, sometimes the pudic and sciatic, &c. &c.

2. VEINS.

The veins attend the arteries and their ramifications; they unite to form the internal iliac vein, except the veins from the rectum, named *Hæmorrhoidales*, which ascend along its back part to join the inferior mesenteric vein.

3. NERVES.

The nerves met with in this dissection, consist of numerous twigs sent off from the lumbar and sacral nerves to supply the parts about the pelvis.

But, in this dissection, we meet with three pair of large nerves, which have their course through the pelvis, and pass to the thigh.

1. Course of the ANTERIOR CRURAL NERVE while in the pelvis. The anterior crural nerve is formed by branches of the first, second, third, and fourth lumbar nerves; at its origin, it lies under the psoas magnus, and, as it descends, passes betwixt the psoas magnus and iliacus internus, till having passed under Poupart's ligament, it emerges from betwixt those muscles, and appears on the outer side of the inguinal artery.

2. Course of the OBTURATOR NERVE within the pelvis. This nerve is formed by branches of the second, third, and fourth lumbar nerves: it lies under the internal border of the psoas magnus, descends into the pelvis, and goes obliquely downwards, to accompany the obturator artery through the thyroid hole.

3. Course of the GREAT SCIATIC NERVE within the pelvis. This nerve arises by branches from the fourth and fifth lumbar, and first three sacral nerves, which unite together to form the largest nervous trunk in the body. The nerve passes betwixt the pyriformis and gemini, and thus escapes from the

back part of the pelvis by the sciatic notch. Some-
times one of the branches goes through the pyriformis,
and joins the sciatic trunk at the back of the pelvis.

ARTERIES, VEINS, AND NERVES ON THE FORE PART AND INSIDE OF THE THIGH.

1. ARTERIES.

THE FEMORAL ARTERY may be said to pass along
the inside of the thigh, where it emerges from under
Poupart's ligament; it lies cushioned on the fibres of
the psoas magnus, is called the Inguinal artery, and
is very nearly in the mid space between the angle of
the pubis, and the anterior superior spine of the ilium,
nearer, however, by a finger's breadth to the former;
having left the groin, it assumes the name of Femoral,
and, in its course down the thigh, runs over the fol-
lowing muscles:—The pectinalis, part of the adductor
brevis, where that muscle projects betwixt the pecti-
nalis and adductor longus; the whole of the adductor
longus, and about an inch of the adductor magnus: It
then slips betwixt the tendon of the adductor magnus
and the bone, and, entering the ham, becomes the
Popliteal artery.   To find the artery in any part of
its course from the crural arch to the tendinous opening,
turn out the foot, ascertain the place of that vessel at
the crural arch, according to the above description,
and then draw a straight line downwards. In this
course, it has the belly of the vastus internus situated
on its outside; it lies between the origin of that mus-
cle, and the tendinous insertion of the muscles over
which it crosses; and there is a strong interlacing of
the tendinous fibres, forming a deep groove for the
artery; it is also invested by a firm sheath, which

consists of condensed cellular membrane, intermixed with some tendinous fibres:—For some inches below Poupart's ligament, this artery is on its fore part only covered by cellular substance, absorbent glands, and the general fascia of the thigh; but, meeting with the inclined line of the sartorius, it is, during the rest of its course, covered by that muscle. It perforates the tendon of the adductor magnus, at the distance of rather more than one-third of the length of the bone from its lower extremity.

Observe that in popliteal aneurism the artery may be taken up either at the upper or inner, the lower or outer, margin of the Sartorius, or immediately behind that muscle: of which situations the first is the best, the second next, and the third by far the least eligible.

BRANCHES OF THE FEMORAL ARTERY.*

The A. PROFUNDA comes off from the femoral artery at the distance of two, three or four inches from Poupart's ligament; it is nearly as large as the femoral itself, runs down for some little way behind it, and terminates in three or four branches, which, perforating the triceps adductor, are named ARTERIÆ PERFORANTES. These, ramifying in every direction, supply all the great mass of muscles situated on the back part of the thigh, and inosculate largely with the sciatic, gluteal, and obturator arteries. The profunda also sends off two considerable branches, which, encircling the upper part of the thigh, are named CIRCUMFLEXA INTERNA, and CIRCUMFLEXA EXTERNA.

The profunda is the only branch of the femoral artery which is constant in its size and situation; for though, during the whole of its course, the femoral gives off branches to the muscles, yet these muscular arteries vary much, sometimes coming off from the

*The Epigastrica and Circumflexa ilii are before described as branches of the inguinal artery.

great artery, sometimes from the profunda, sometimes coming off as a large single trunk which subdivides, while at other times there are three or four distinct arteries.

The branches of the femoral artery may be enumerated as follows:—1. Some twigs to the inguinal glands, and some to the external parts of generation, named Pudicæ Externæ. 2. Muscularis interna. 3. Muscularis externa. 4. Profunda.

The OBTURATOR ARTERY, arteria obturatrix, which is a branch of the internal iliac artery, passes through the notch at the upper part of the foramen thyroideum, and ramifies on the deep seated muscles at the upper and inner part of the thigh.

2. VEINS.

The FEMORAL VEIN adheres closely to the femoral artery in its passage out of the abdomen, and accompanies it in its course down the thigh, where it passes under Poupart's ligament; it lies on the inside of the artery, but, as it descends, it turns more and more posteriorly, so that where they perforate the tendon of the adductor magnus, the vein is situated fairly behind the artery.

Its branches correspond to those of the femoral artery; but about an inch below Poupart's ligament, it receives the vena saphena major, to which there is no corresponding artery.

The OBTURATOR VEIN accompanies the obturator artery, and has the same distribution.

3. NERVES.

NERVUS CRURALIS ANTERIOR, or the Anterior Crural nerve, where it passes from under Poupart's ligament, lies about half an inch on the outside of the

femoral artery; it immediately divides into a number of branches, which supply the muscles and integuments on the fore part and outside of the thigh. A considerable branch, however, accompanies the femoral artery, crosses that vessel where it is about to perforate the adductor magnus, runs behind the sartorius, and appears as a cutaneous nerve on the inside of the knee: proceeding downwards on the inside of the leg, it is largely distributed over the tibia, is intricated with the vena saphena major, and terminates on the inner ankle, and upper part of the foot. This branch is named NERVUS SAPHENUS, or CUTANEUS LONGUS.

Another branch, which is distributed to the vastus internus, generally runs for some way in company with the femoral vessels.

NERVUS OBTURATOR, or the obturator nerve, is found accompanying the obturator artery and vein; it has the same distribution, and some branches extend as far as the internal condyle of the thigh bone, and communicate with the nervus saphenus.

VESSELS AND NERNES ON THE POSTERIOR PART OF THE THIGH.

ARTERIES.

1. ARTERIA GLUTEA, or ILIACA POSTERIOR.— This is the largest branch of the internal iliac artery; it passes out of the pelvis at the upper part of the sciatic notch. On raising the gluteus maximus and medius, this artery is seen coming over the pyriformis, betwixt the superior edge of that muscle and the inferior edge of the os ilium (where that bone forms the upper part of the sciatic notch,) and immediately

behind the posterior fibres of the gluteus minimus. The principal trunk passes under the gluteus medius, and ramifies on the dorsum of the os ilium; other large branches are also continued to the gluteus maximus, and the muscles situated on the back part of the pelvis.

2. ARTERIA SCIATICA, vel ISCHIATICA, is another large branch of the internal iliac, which comes out from under the pyriformis, between the lower edge of that muscle and the superior sacro-sciatic ligament; it lies upon the back part of the hip, under the gluteus maximus;—its principal branches descend between the trochanter major and tuberosity of the ischium; it sends other twigs round towards the anus and perineum.

Both these arteries inosculate with the other branches of the internal and external iliac.

The VEINS correspond exactly to the arteries. They terminate in the internal iliac vein.

NERVES.

NERVUS SCIATICUS, vel ISCHIATICUS, or the Great Sciatic Nerve, is seen coming out of the pelvis, along with the sciatic artery, below the pyriformis. It descends over the gemini and quadratus femoris in the hollow betwixt the great trochanter and the tuberosity of the ischium,—runs down the back part of the thigh, anterior to, *i. e.* nearer the bone than the hamstring muscles; being situated between the anterior surface of the semimembranosus, and the posterior surface of the triceps adductor longus. After sending off the peroneal nerve, it arrives in the ham, and becomes the POPLITEAL NERVE. In this course it gives off several branches to the muscles and integuments. It sometimes perforates the belly of the pyriformis by distinct trunks, which afterwards unite.

DISSECTION OF THE HAM AND FASCIA ON THE BACK PART OF THE LEG.

On removing the integuments from the back part of the knee joint and leg, we observe a FASCIA, which covers the great vessels and the muscles. It is evidently continued from the great fascia of the thigh, is strengthened by adhesions to the condyles of the femur, and the head of the fibula, and is prolonged upon the muscles on the back of the leg.

Upon dissecting back that part of the fascia which covers the ham, the GREAT SCIATIC NERVE appears, lying between the outer and inner hamstring muscles. This nerve, having given off branches about the ham, and to the integuments on the back of the leg, divides at some distance above the condyles of the femur into two large branches.

1. The Greater Nerve continues its course betwixt the heads of the gastrocnemii muscles. In the ham it is named the POPLITEAL NERVE, and where it descends in the leg, the POSTERIOR TIBIAL.

2. The Smaller Nerve, which is the external branch, is named the PERONEAL or FIBULAR NERVE; it passes outwards and obliquely downwards, runs between the external head of the gastrocnemius, and the tendon of the biceps flexor cruris; and sinks among the muscles which surround the head of the fibula.

BRANCHES OF THE PERONEAL NERVE.

(1.) Cutaneous branches are sent off from the peroneal nerve at its uppermost part over the gastrocnemius to the integuments in the back part of the leg, and outer side of the foot. Branches also are distributed about the joint.

(2.) A large branch, the ANTERIOR TIBIAL NERVE, passes under the flesh of the peroneus longus and
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extensor longus digitorum, where those muscles arise from the heads of the fibula and tibia; and comes in contact with the anterior tibial artery, which it accompanies down the leg.

(3.) Another branch passes into the upper extremity of the peroneus longus, and is continued in the substance of that muscle for some space. It then emerges from beneath it, and continues its course under the muscles on the fore part and outside of the leg; it pierces this fascia, and, becoming cutaneous, is lost on the ankle and upper surface of the foot.

Below the great sciatic nerve, there is much cellular membrane and fat, which being removed, the GREAT POPLITEAL VEIN is exposed. It adheres to the POPLITEAL ARTERY, which lies under it close upon the bone.

ARTERIA POPLITEA is the trunk of the FEMORAL, which assumes that name, after it has perforated the tendon of the triceps. It lies between the condyles of the femur, close upon the bone, and descends between the heads of the gastrocnemius. It runs over the popliteus, and under the gastrocnemius, that is, in the erect position it is anterior to the gastrocnemius, and posterior to the popliteus: at the lower edge of the popliteus, the popliteal artery divides into the ANTERIOR and POSTERIOR TIBIAL ARTERIES.

BRANCHES.

1. Two PERFORATING ARTERIES come off from the artery immediately after it has entered the ham; they are small, and perforate from the ham to the fore part of the thigh.

2. ARTICULAR ARTERIES are four or five small twigs, ramifying over the knee-joint and neighbouring muscles, inosculating with one another, and with the arteries below the knee.

3. Two branches are sent to the two heads of the gastrocnemii muscles; twigs are also given to the soleus, plantaris, &c.

The POPLITEAL VEIN receives branches corresponding to those of the artery; it lies behind the artery in the erect posture.

About two inches above the condyle, it receives the VENA SAPHENA MINOR, which returns the blood from the outer side of the foot;—the trunk of this vein lies under the fascia.

OF THE VESSELS AND NERVES IN THE FORE PART OF THE LEG AND FOOT.

1. ARTERIES.

ARTERIA TIBIALIS ANTICA.—The anterior tibial artery passes from the ham betwixt the inferior edge of the popliteus, and the superior fibres of the soleus, and then through a large perforation in the interosseous ligament, to reach the fore part of the leg; this perforation is much larger than the size of the artery, and is filled up by the fibres of the musculus tibialis posticus, which may thus be said to arise from the fore part of the tibia. The artery then runs down close upon the middle of the interosseous ligament, between the tibialis anticus and extensor proprius pollicis; below the middle of the leg, it leaves the interosseous ligament and passes gradually more forwards; it crosses under the tendon of the extensor proprius pollicis,* and is then situated between that

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* It is crossed by that tendon just above the lower head of the tibia, while under the annular ligament.

tendon, and the first tendon of the extensor longus
digitorum: at the ankle it runs over the fore part of
the tibia, being now situated more superficially; then
over the astragalus and os naviculare, and over the
junction of the os cuneiforme internum and medium;
crossing under that tendon of the extensor brevis dig-
itorum which goes to the great toe. Arriving at the
space between the bases of the two first metatarsal
bones, it plunges into the sole of the foot, and immedi-
ately joins the plantar arch.

BRANCHES:

1. A. RECURRENS, which ramifies over the fore
part of the knee, inosculating with the articular arte-
ries.

2. Numerous twigs to the tibialis anticus, extensor
pollicis, and other muscles on the fore part of the leg.

3. A. MALLEOLARIS INTERNA ramifies over the
inner ankle, and inosculates with the peroneal and pos-
terior tibial arteries.

4. The EXTERNAL MALLEOLAR ramifies over the
outer ankle.

5. The TARSAL and METATARSAL ARTERIES, are
two small branches which cross the tarsal and
metatarsal bones, and pass obliquely to the outer edge
of the foot.

From the tarsal or metatarsal artery come off the
INTEROSSEAL ARTERIES, which supply the interosseal
spaces, and the back part of the toes.

6. A large branch comes off from the anterior tibial,
where it is about to plunge into the sole of the foot;
it runs along the space betwixt the first two metatar-
sal bones, and at the anterior extremity of those bones,
bifurcates into,

(1.) A. DORSALIS HALLUCIS, a considerable branch
which runs on the back part of the great toe.

(2.) A branch which runs on the inner edge of the toe next to the great one.

2. VEINS.

The ANTERIOR TIBIAL VEIN consists of two branches, which accompany the artery and its ramifications.

3. NERVES.

The ANTERIOR TIBIAL NERVE is a branch of the peroneal nerve; it is seen in the ham arising from the peroneal, and crossing under the muscles on the outside of the fibula:—It emerges from under the extensor longus digitorum, comes in contact with the anterior tibial artery, and accompanies it down the leg: it is distributed on the back of the foot and toes.

VESSELS AND NERVES OF THE POSTERIOR PART OF THE LEG.

1. ARTERIES.

ARTERIA TIBIALIS POSTICA. The posterior tibial artery, which is the continued trunk of the popliteal, sinks under the origins of the soleus, and runs down the leg between that muscle and the more deeply seated flexors of the toes: It does not lie in immediate contact with the fibres of the flexors, but, like the femoral artery, is invested by a strong sheath of condensed cellular membrane. It is, together with its veins and accompanying nerve, also supported by the fascia which binds down the deep seated muscles. As it descends, it gradually advances more forwards, fol-

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lowing the course of the flexor tendons: it passes behind the inner ankle, in the sinuosity of the os calcis, lying posterior to the tendon of the flexor longus digitorum, and anterior to that of the flexor longus pollicis. Here it is close upon the bone, and in the living subject its pulsation may be felt. It sinks under the abductor pollicis, arising from the os calcis, and immediately divides into two branches:

(1.)The, Internal Plantar Artery is the smaller, and ramifies among the mass of muscles situated on the inner edge of the sole of the foot.

(2.) The External Plantar Artery directs its course outwards, and having reached the metatarsal bone of the little toe, forms the PLANTAR ARCH, which crosses the three middle metatarsal bones obliquely, about their middle, and terminates at the space betwixt the first two metatarsal bones, where the trunk of the anterior tibial artery joins the arch. The convexity of this arch is towards the toes, and sends off the following branches.

a, A small branch to the outside of the little toe.

b, Ramus digitalis primus, or the first digital artery, which runs along the space between the last two metatarsal bones, and bifurcates into two branches, one to the inner side of the little toe, and the other to the outer side of the next toe.

c, The second digital artery, which runs along the next interosseous space, and bifurcates in a similar manner.

d, The third digital artery.

e, The fourth, or great digital artery, which supplies the great toe, and the inner side of the toe next to it.

The concavity of the arch sends off the interosseal arteries, three or four small twigs, which go to the deep-seated parts in the sole of the foot, and, perforating between the metatarsal bones, inosculate

with the superior interosseal arteries on the upper
side of the foot.

The branches of the Posterior Tibial Artery in the
leg are,

1. The PERONEAL ARTERY, which comes off from
the tibial a little after it has sent off the anterior tibial,
of which this artery is sometimes a branch; it is
generally of a considerable size, sometimes nearly as
large as the tibial itself; it runs upon the inside of the
fibula, giving numerous branches to the peroneal
muscles and flexor of the great toe; but its course is
irregular and inconstant. At the lower part of the
leg, it splits into,

a, A. PERONEA ANTERIOR, which passes betwixt
the lower heads of the tibia and fibula, to the fore-
part of the ankle, where it is lost. -

b, A. PERONEA POSTERIOR is properly the termi-
nation of the artery; it descends along the sinuosity
of the os calcis, inosculating with the branches of the
tibialis postica, and terminates in the posterior part
of the sole of the foot.

2. Muscular branches arise from the artery as it
descends; twigs also are sent over the heel and ankle.

2. VEINS.

VENÆ TIBIALES POSTICÆ.—The posterior tibial
veins are generally two in number; they accompany
the artery, and terminate in the popliteal vein; they
are formed of branches, which correspond to those
of the artery.

3. NERVES.

The POSTERIOR TIBIAL NERVE, which is the con-
tinuation of the great sciatic nerve, sinks below the
soleus, and accompanies the posterior tibial artery; it
gives off numerous filaments to the muscles in its
neighbourhood. At first it continues, as in the ham,

immediately behind the artery, but it gradually gets on the outside of it as it descends; so that where they pass along the sinuosity of the os calcis, the nerve is situated close in contact with the side of the artery, but nearer to the projection of the heel than that vessel is.   With the artery, it divides into,

1. The internal plantar nerve, and,

2. The external plantar nerve.—These nerves supply the muscles and integuments in the sole of the foot.

OF THE VESSELS OF THE BRAIN.

The arteries ramify largely on the pia mater, before they enter the substance of the brain; they come from two large branches.

1. The Internal Carotid Artery enters the skull by a winding course through the foramen caroticum of the temporal bone.   After passing through the cavernous sinus, it divides into three branches: 1. Anterior cerebri, passing between the two anterior lobes; 2. Media cerebri, entering the fissura sylvii; 3. Ramus communicans, uniting with the basilar. The carotid, while in the cavernous sinus, gives off the arteria ophthalmica, which passes through the foramen opticum to the eye and its appendages.

2. The Vertebral Artery arises from the subclavian, ascends through the foramina in the transverse processes of the cervical vertebræ, enters the cranium by the foramen magnum, and gives branches to the dura mater and spinal marrow.—Uniting with its fellow, it forms the basilar artery, which gives branches to the internal ear, branches to form the circulus arteriosus, and then divides into two large branches called Posteriores Cerebri, which supply the back parts of the cerebrum.

The VEINS pour their blood into the sinuses, which are numerous. None of these veins require particular attention, except the ophthalmic vein, which passes through the foramen lacerum orbitale superius. The principal sinuses, viz. the longitudinal, the two lateral, the inferior longitudinal, &c. have been described in the dissection of the brain. The remainder of these sinuses are situated in folds of the dura mater, but are not regular in their situation. They transmit their blood to the longitudinal and lateral sinuses, which terminate in forming the internal jugular veins.

For the description of the meningeal arteries see page 98, and for the nerves of the brain, see page 108.

OF THE VESSELS AND NERVES SEEN IN THE DISSECTION OF THE NECK.

ARTERIES.

STARTING from the arch of the aorta, the student will see three large arteries coming off from the upper part of that arch, viz: the arteria innominata, the left carotid and the left subclavian. From the innominata proceed the right common carotid, and the right subclavian.

The carotid artery ascends from the thorax by the side of the trachea; on its outer side it has the internal jugular vein, and behind it the par vagum and intercostal nerves. All these parts are connected and inclosed by condensed cellular membrane, which forms for them a kind of sheath. At the bottom, and in the middle of the neck, the carotid is covered by the sterno-cleido-mastoideus; at the upper part, by adipose

membrane, absorbent glands, and the platysma myoides. It lies deep on the muscles of the spine, and gives off no branches, until it reaches the space between the larynx and the angle of the jaw, just below the cornu of the os hyoides, where it divides into the external and internal carotids.

Of the two, the internal carotid is situated more outwardly; it passes deep to the base of the cranium, where it enters the foramen caroticum, to supply the brain.

The external carotid immediately begins to send off branches.

Anteriorly it sends off,

1. The A. THYROIDEA SUPERIOR.—This artery passes downwards and forwards, to ramify on the thyroid gland, where it inosculates with the artery of the other side, and with the inferior thyroid arteries. In this course, it sends ramifications to the integuments, the outside of the larynx, the muscles, &c. and one remarkable branch, the A. LARYNGEA, which sometimes arises from the trunk of the external carotid; it is a small artery which divides betwixt the os hyoides and thyroid cartilages, to supply the internal parts of the larynx.

2. A. LINGUALIS, vel Ranina.—The sublingual artery passes over the cornu of the os hyoides, then behind the mylo hyoideus, over the stylo-glossus, hyo-glossus, and genio-hyo-glossus, to which it gives branches, and terminates in running along the inferior part of the tongue from its base to its apex. It gives branches, to the muscles about the chin, and to the substance and back part of the tongue.

3. A. MAXILLARIS EXTERNA.—The external maxillary artery passes under the stylo-hyoideus and posterior belly of the digastricus, then buries itself under the submaxillary gland. It runs over the lower jaw before the anterior edge of the masseter muscle, to supply the face.

In its passage, it gives off numerous branches.—One is worthy of notice, which runs along under the line of the lower jaw, and passing over the jaw near the symphysis, supplies the chin. Other twigs supply the submaxillary gland, &c.

Posteriorly the carotid sends off,

4. A. OCCIPITALIS.—The occipital artery crosses backwards and upwards, over the internal jugular vein and internal carotid artery, under the belly of the digastric muscle: it passes through a slight groove in the mastoid process below its great fossa, and ramifies on the back part of the head. A remarkable branch of the occipital passes towards the base of the skull, to inosculate near the foramen magnum occipitis, with branches from the vertebral and posterior cervical arteries.

5. A. PHARYNGEA is a small branch of the carotid, which passes inwards to the pharynx and base of the skull.

6. POSTERIOR AURIS, which passes backwards and upwards in the fold between the ear and scalp, and is distributed on the integuments of the head.

The external carotid ascends behind the angle of the jaw, and enters the parotid gland, where it divides into,

7. A. MAXILLARIS INTERNA.
8. A. TEMPORALIS.
9. A. TRANSVERSALIS FACIEI.

These arteries will be described in the dissection of the face.

VEINS.

The INTERNAL JUGULAR VEIN is a continuation of the lateral sinus which passes through the foramen lacerum in the base of the cranium. It comes out deep from under the angle of the jaw, and in its course down the neck, it runs on the outer side of the

carotid artery, before it reaches the thorax; it passes rather more forwards than the artery, to join the subclavian vein.

Its branches accompany the ramifications of the external carotid. At first the vein which accompanies each artery is a single branch, but it soon subdivides, so that two veins accompany one artery.

NERVES.

1. The EIGHTH PAIR, or Par Vagum.—On separating the internal jugular vein, and trunk of the carotid artery, the par vagum is seen lying in the same sheath of cellular substance with those vessels. It lies in the triangular space formed betwixt the back part of the artery and vein, and the subjacent muscles. This nerve comes out of the foramen lacerum with the jugular vein; hence it adheres to that vein more closely than to the artery or muscles; it runs down the neck behind these vessels.

In this course it gives off several nerves.

(1.) At the base of the cranium, it sends off several filaments, which are connected with the other nerves coming out of the base of the skull; such as the ninth pair, the superior cervical ganglion of the intercostal, &c.

(2.) NERVUS GLOSSO-PHARYNGEUS is sent off from the eighth pair, deep under the angle of the jaw. It passes behind the carotids towards the muscles arising from the styloid process; one principal branch of it passes between the stylo-pharyngeus and styloglossus to the tongue, while other twigs run behind the stylo-pharyngeus, to supply the pharynx.

(3.) NERVUS LARYNGEUS SUPERIOR, vel Internus.—The superior or internal laryngeal nerve passes behind the internal carotid artery, obliquely, downwards and forwards; then, under the hyo-thyroideus

muscle, it plunges betwixt the os hyoides and thyroid cartilage, accompanying the laryngeal artery, and supplying the internal parts of the larynx.

(4.) In the neck, also, the par vagum gives off filaments to the cervical ganglions of the intercostal nerve, and to communicate with the other nerves of the neck. Filaments also unite with twigs of the intercostal, and run down over the carotid artery to the great vessels of the heart, where they form the superior cardiac plexus.

The par vagum enters the thorax by passing betwixt the subclavian artery and vein.

2. The INTERCOSTAL, or GREAT SYMPATHETIC NERVE.—This nerve lies behind the carotid, in the cellular membrane, betwixt that vessel and the muscles covering the vertebræ of the neck. It is distinguished from the par vagum by being smaller, lying nearer the trachea, and adhering to the muscles of the spine; also by its forming several ganglions. It arises from the sixth pair in the cranium, and comes out by the same foramen as the carotid artery.

Immediately after its exit from the skull, it forms the SUPERIOR CERVICAL GANGLION, which is very long, and of a reddish color. The nerve afterwards becomes smaller, and descends; and opposite the fifth or sixth cervical vertebra, it forms another swelling, the INFERIOR CERVICAL GANGLION. Sometimes it has another ganglion about the fourth or fifth vertebra of the neck, the MIDDLE CERVICAL GANGLION; but this is not a constant appearance. The nerve then passes behind the subclavian artery into the thorax.

The branches of the intercostal nerve are numerous, and they generally pass off from the ganglions. Immediately below the base of the cranium, twigs go to the eighth and ninth pairs, and to the upper cervical nerves. In the middle of the neck, some twigs pass over the carotid; others go to the parts covering the

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trachea, and uniting with filaments of the par vagum, form the external laryngeal nerves; others unite with the descendens noni, or descending branch of the ninth pair, and some filaments assist the twigs of the par vagum to form the superior cardiac nerve. In the lower part of the neck, twigs are sent to communicate with the cervical nerves, &c.

3. The NINTH PAIR, Nervus Hypo-glossus, or Lingual nerve, having left the skull by the anterior condyloid foramen, is connected with the eighth pair and intercostal nerve. Like them, it lies deep, and comes out from under the angle of the jaw. It is seen passing from behind the internal jugular vein, and then over the carotid artery, running betwixt these two vessels. It next passes under the mylo-hyoideus, running over the stylo-glossus, hyo-glossus, and genio-hyo-glossus, which last muscle its numerous branches perforate.

BRANCHES.—While the nerve is passing betwixt the jugular vein and the carotid artery, it sends off the DESCENDENS NONI.—This small and delicate nerve descends on the fore part of the vein and artery, and is distributed to the muscles on the anterior part of the trachea. It is joined by filaments of the cervical nerves.

4. The LINGUAL BRANCH sent off by the third branch of the fifth pair of nerves, is also seen in the dissection of the neck. It is found under the mylo-hyoideus; it lies close upon the lower edge of the jaw-bone, betwixt the inferior edge of the pterygoid-eus internus and the upper part of the mylo-hyoideus. It gives numerous twigs to the sublingual gland and submaxillary duct, which are situated near it, and is lost in the substance of the tongue.

5. NERVUS ACCESSORIUS ad Par Vagum.—The accessory nerve, having passed out of the cranium with the par vagum, separates from it, passes behind

the internal jugular vein obliquely downwards and backwards; it perforates the mastoid muscle, and is distributed to the trapezius and muscles about the shoulder; it is much connected with the third and fourth cervical nerves.

6. The SEVEN CERVICAL NERVES come out from the foramina betwixt the vertebræ of the neck. They send numerous branches to the muscles, &c., on the side of the neck, and communicate by filaments with all the other nerves in the neck.

In this stage of the dissection, we may also see,

7. The PHRENIC NERVE, formed by branches of the third and fourth cervical nerves. This small nerve lies upon the belly of the anterior scalenus muscle, and dives into the thorax, betwixt the subclavian artery and vein.

8. The RECURRENT NERVE, a branch sent off from the par vagum in the thorax, is also seen in the neck. Dissect between the under surface of the trachea and œsophagus at the lower part of the neck, and you will find the recurrent nerve situated there.

9. The upper part of the GREAT BRACHIAL PLEXUS may be seen arising on the side of the neck, from the lower cervical nerves, and passing behind the anterior scalenus, to reach the arm.

A general view of the distribution of the spinal nerves may be usefully subjoined in this place, to complete the description of the nerves.

1. The CERVICAL NERVES consist of seven pairs; they spread their branches over the side of the neck, and to the muscles moving the head and shoulders. The superior nerves send branches to the side of the head, and the inferior to the upper part of the chest and back. They also communicate freely with each other, and with all the neighboring nerves;—high in the neck, and under the jaw, with the portio dura of the seventh pair, with the fifth, eighth, and ninth pairs,

and with the great sympathetic;—towards the middle of the neck, with the descendens noni, the sympathetic and eighth pair, and in the lower part of the neck with the sympathetic.

The PHRENIC NERVE is formed by branches of the third, fourth, and fifth cervical nerves, passes obliquely down the neck through the thorax, then on each side of the pericardium, and is distributed to the diaphragm.

The AXILLARY PLEXUS is formed by the principal parts of the trunks of the fourth, fifth, sixth, and seventh cervical, and first dorsal nerves.

2. The DORSAL NERVES are twelve pairs. They arise from the spinal marrow in the same manner as the cervical. Each nerve emerges betwixt the heads of the ribs, gives twigs to the great sympathetic nerve, and twigs which pierce backwards to the muscles of the back; then, entering the groove in the lower edge of each rib, it accompanies the intercostal artery, and runs towards the anterior part of the thorax, supplying the great muscles of the chest, giving twigs to the diaphragm, and muscles of the abdomen.

3. The LUMBAR NERVES are five pairs. They arise in the same manner; their trunks are covered by the psoas magnus muscle. Each nerve gives twigs to the muscles of the loins and back, and to the sympathetic nerves, and runs obliquely downwards to supply the abdominal muscles and integuments of the groin and scrotum; but the trunks of these nerves assist in forming the nerves of the thigh.

4. The SACRAL NERVES are five on each side, arising from the cauda equina. They come out through the anterior foramina, and send small branches to the neighboring parts; but the great trunks of these nerves are united with the lumbar nerves to form the nerves of the lower extremity, viz.

(1.) The ANTERIOR CRURAL NERVE, passing out

under Poupart's ligament to the extensor muscles of
the leg, is formed by branches of the first, second,
third, and fourth lumbar nerves.

(2.) The OBTURATOR NERVE, leaving the pelvis by
the thyroid holes, and being distributed to the deep
seated muscles on the inside of the thigh, arises from
branches of the second, third, and fourth lumbar
nerves.

(3.) The ISCHIATIC or SCIATIC NERVE, the greatest
nerve of the body, passes out from the back part of
the pelvis, through the sacro-sciatic notch, and takes
its course along the back of the thigh, to supply the
thigh, leg, and foot; it is formed from the last two
nerves of the loins and the first three of the sacrum.

All these nerves of the spine communicate freely by
numerous twigs, and by the intervention of

The GREAT SYMPATHETIC NERVE, or INTERCOS-
TAL. This nerve, originally derived from the sixth
pair, and from some filaments of the fifth, passes out
of the cranium with the carotid artery. It then de-
scends through the neck, and forms three ganglions in
its course, which give twigs to the neighboring parts,
and are joined by filaments from the cervical nerves,
and the eighth and ninth pairs. The intercostal then
enters the thorax, and descends by the side of the
vertebræ, behind the pleura, giving filaments, which,
joining with twigs of the eighth pair, form several
plexuses to supply the heart, lungs, &c. In the ab-
domen it descends on the lumbar vertebræ, and at last
terminates in the pelvis on the extremity of the
coccyx.

While in the thorax, it gives off a branch, which,
uniting with branches of the dorsal nerves, forms

The ANTERIOR INTERCOSTAL, or SPLANCHNIC
NERVE.—This nerve, passing betwixt the crura of the
diaphragm, enters the abdomen, forms the semilunar
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ganglion, and is distributed by numerous plexuses to all the abdominal viscera.

The Eighth pair, or par vagum, has also a very long course; it arises in the head, passes through the neck, to which it gives several branches. It enters the thorax anterior to the subclavian artery; here it gives off a remarkable branch, called the Recurrent, because it is reflected round the arch of the aorta on the left side, and round the subclavian artery on the right, and ascends to be distributed on the trachea, œsophagus, and larynx. The nerve then passes through the thorax, and, entering the abdomen, terminates in the stomach; in this course it has frequent communications with the great sympathetic, which it assists in forming the different plexuses that supply the thoracic and abdominal viscera. It is distributed to the heart, lungs, liver, spleen, stomach, and duodenum.

COURSE OF THE SUBCLAVIAN ARTERY ON EACH SIDE.

THE subclavian artery passes upwards and outwards, runs under the clavicle, and over the middle of the first rib; it passes between the bellies of the anterior and middle scaleni muscles, then runs under the arch of the pectoralis minor, and enters the axilla, where it assumes the name of Axillary Artery.

The order in which the following arteries are sent off from the subclavian varies much; sometimes they come off singly, at other times in large trunks, which subdivide.

Backwards the subclavian sends off,

1. The VERTEBRAL ARTERY.—This artery arises from the back part of the subclavian, passes outwards and enters the foramen in the transverse process of

the last cervical vertebra, and ascends through the transverse processes of the vertebræ, to enter the foramen magnum of the occipital bone.

2. The INFERIOR THYROID ARTERY ascends obliquely inwards, passes behind the internal jugular vein, to ramify on the thyroid gland, where it inosculates largely with the superior thyroid arteries. Branches from this artery pass to the trachea and œsophagus, to the muscles of the neck, and of the scapula: one of these is the supra scapulary artery. (See the account of the branches of the axillary artery.)

3. A. CERVICALIS ANTERIOR, vel Profunda, passes deep to the muscles situated on the fore part of the cervical vertebræ, and ascends as high as the base of the skull.

4. A. CERVICALIS POSTERIOR, vel Superficialis, is larger than the last; it ascends obliquely outwards, generally passes betwixt the transverse processes of the last cervical and first dorsal vertebræ, and ascends on the back part of the neck, deeply seated; some of its branches pass down the back superficially.

Anteriorly, the subclavian artery gives off,

5. A. MAMMARIA INTERNA. The internal mammary arises from the fore part of the subclavian, opposite the cartilage of the first rib; it runs down on the inside of the cartilages of the ribs, and terminates in the abdominal muscles, where it inosculates with the epigastric. It is a large artery, and its branches are very numerous. They pass to the external muscles of the chest, to the intercostal muscles, pleura, &c. It also sends off the ARTERIA PHRENICA SUPERIOR, vel comes nervi phrenici, which, with two veins, accompanies the phrenic nerve to the diaphragm.

6. The subclavian artery gives twigs to the root of the neck, and to the muscles about the scapula.

7. A. INTERCOSTALIS SUPERIOR. Frequently a

trunk comes off from the subclavian, especially on the right side, which passes downwards and backwards, and lodges itself by the spine, to supply the two or three superior intercostal spaces.

COURSE OF THE SUBCLAVIAN VEIN.

The subclavian vein is situated anteriorly to the subclavian artery; it passes inwards behind and under the subclavius muscle, and before and over the belly of the anterior scalenus (so that this last muscle lies betwixt the vein and artery.) It runs over the first rib, from under the arch of the pectoralis minor, where it is found in contact with the axillary artery, and is called the Axillary Vein.

The branches of this vein accompany and corres-pond to the ramifications of the subclavian artery, returning the blood from the thyroid gland, neck, chest, intercostal spaces, &c. The subclavian vein also receives the internal jugular, which passes down be-hind the clavicle.

THE COURSE OF THE BRACHIAL PLEXUS OF NERVES

May also be examined. This plexus is formed by branches of the four lower cervical and first dorsal nerves, which pass between the anterior and middle scaleni muscles into the axilla. In this passage they are situated higher up than the artery.

DISSECTION OF THE AXILLA OR ARM-PIT.

THERE is a considerable resemblance in the dis-section of the axilla to that of the ham or groin; in each of these situations we meet with important blood-

vessels and nerves, closely connected, embedded in adipose membrane, and seated in the flexure of a joint.

The axilla is formed by two muscular folds which bound a middle cavity. The anterior fold is formed by the pectoralis major passing from the thorax to the arm, the posterior by the latissimus dorsi coming from the back.

In the intermediate cavity there is a quantity of cellular membrane and absorbent glands, covering and connecting the great vessels and nerves. This cellular and adipose membrane is continued from the interstice above the clavicle betwixt the edges of the trapezius and mastoid muscles. All the space before the root of the neck above the first rib, and under the clavicle and coracoid process of the scapula, and the interstices of the muscles passing through that space, are filled up by a quantity of adipose membrane; and this is not exactly similar to the fat in other parts of the body; it is more granulated, watery, and of a reddish color; it surrounds the great vessels and nerves, rendering the dissection both tedious and difficult.

The AXILLARY VEIN will be found lying anterior to the artery, that is, nearer the integuments. It seems to be a continuation of the basilic vein, which runs along the inside of the arm quite superficial, and of the two or three venæ satellites, or veins which accompany the brachial artery. The axillary vein receives branches corresponding to the ramifications of the artery. Passing under the clavicle, it becomes the subclavian vein, and runs over the first rib, and before the anterior scalenus muscle into the thorax.

Deeper seated, and immediately behind the axillary vein, lies the AXILLARY ARTERY. It is seen coming from under the clavicle; from under the arch formed by the pectoralis minor, it comes over the middle of the first rib, and between the anterior, and middle

scaleni muscles. In the axilla it is surrounded by the meshes of the nerves, and runs along the inferior edge of the coraco-brachialis muscle; when it has passed the anterior edge of the pectoralis major, it assumes the name of the Brachial Artery.

The branches of the axillary artery are,

1. A. MAMMARIA EXTERNA; called also, A. Thoracicæ Externæ.—The external mammary artery consists of three or four branches which run downwards and forwards obliquely over the chest. These branches sometimes come off separately from the axillary artery, at other times by one or two common trunks, which subdivide. They supply the pectoral muscles and mamma. Some of their branches pass to the muscles of the shoulder, to the side of the chest, and to the muscles on the inside of the scapula.

2. A. SCAPULARIS INTERNA, Supra-scapularis, or Dorsalis Scapulæ, is sent off from the back-part of the axillary artery. It runs across the bottom of the neck towards the root of the coracoid process, and passes through the semilunar notch in the superior costa of the scapula; it supplies the supra-spinatus muscle, and then passes under the acromion, to ramify on the muscles below the spine of the scapula. It is generally a branch of the A. Thyroidea Inferior, and is then named A. Transversalis Humeri.

3. A. SCAPULARIS EXTERNA, INFRA-SCAPULARIS, or Thoracica Posterior, arises from the under and back part of the axillary artery, attaches itself to the inferior costa of the scapula, where it splits into two great branches: 1. A large branch, which passes to the outer surface of the scapula below the spine, and has its principal ramifications close upon the bone. 2. The other branch (which is larger) passes to the inner surface of the scapula, supplies the subscapularis, and sends branches downwards to the muscles of the back and loins.

4. ARTERIA CIRCUMFLEXA HUMERI POSTERIOR, Humeralis, or Reflexa Articularis, arises from the lower and fore part of the axillary artery, and runs backwards close to the bone, surrounds its neck, and is lost on the inner surface of the deltoid; it gives also twigs to the joint and neighbouring muscles.

5. A. CIRCUMFLEXA ANTERIOR is a much smaller artery, often a branch of the circumflexa posterior; it encircles the neck of the bone on its fore-part, and is lost on the inner surface of the deltoides, where it inosculates with the posterior circumflex artery.

The GREAT BRACHIAL NERVES accompany the subclavian artery over the first rib. In the axilla they are united by numerous cross branches, forming the Axillary or Brachial Plexus, which is continued from the clavicle as low as the edge of the tendon of the latissimus dorsi, and which surrounds the axillary artery with its meshes.

From the axillary plexus seven nerves pass off.

1. NERVUS SUPRA-SCAPULARIS, Scapularis Externus, Scapularis.—This nerve comes off from the upper edge of the plexus; it crosses the axilla at the highest part, runs towards the superior costa of the scapula, accompanies the external scapular artery through the semilunar notch, and supplies the muscles on the posterior surface of the scapula.

2. N. CIRCUMFLEXUS, Articularis, Axillaris, or Humeralis, lies deep: it passes from the back part of the plexus, goes backwards round the neck of the bone, accompanying the posterior circumflex artery, and is distributed to the musculus deltoides, and the muscles on the outside of the arm. Small nerves also pass from the axillary plexus to the subscapular muscle, the teres major, latissimus dorsi, and pectoral muscles.

3. The External Cutaneous Nerve, or Nervus-Musculo-cutaneus.

4. The Radial Nerve.
5. The Ulnar Nerve.
6. The Muscular or Spiral Nerve.
7. The Internal Cutaneous Nerve.

These five nerves will be described in the dissection of the arm and fore-arm.

DISSECTION OF THE POSTERIOR MEDIAS-TINUM,* AND OF THE NERVES AND VESSELS WHICH HAVE THEIR COURSE THROUGH THE THORAX.

COURSE of the PHRENIC NERVE through the thorax.—On each side this nerve is seen entering the thorax betwixt the subclavian artery and subclavian vein; it then proceeds downwards and forwards before the root of the lungs, and on the outside of the pericardium, betwixt that bag and the pleura; and is lost on the diaphragm. The left phrenic nerve has a somewhat longer course than the nerve of the right side, as it passes over the pericardium, where that bag covers the apex of the heart. This nerve is accompanied by one artery and two veins; some twigs pass from the phrenic nerve into the abdomen, to the liver, &c.

Behind the arch of the aorta and great vessels passing from the heart, is seen the TRACHEA. It enters the thorax between the two pleuræ, and, opposite the third or fourth dorsal vertebra, bifurcates into two parts: one of which passes toward the right, the other toward the left, to enter the lung of each side.

* By *Posterior Mediastinum* is designed that part of the mediastinum situated behind the root of the lungs.

By folding back the lungs towards the left side of the chest, we expose the pleura reflected from the under surface of the root of the lungs to the spine and ribs. A triangular space is formed betwixt the two pleuræ and the bodies of the dorsal vertebræ; this space or cavity is named the cavity of the posterior mediastinum. It contains many important parts, and must therefore be carefully dissected.

But first let us attend to the course of the intercostal, or great sympathetic nerve, which is seen running by the side of the spine.

The INTERCOSTAL NERVE, where it enters the thorax, is situated behind the great vessels; close upon the articulation of the first rib with the body of the first dorsal vertebra, it forms a ganglion, a twig of which fairly encircles the subclavian artery, while other filaments are entwisted round the root of the vertebral artery. The intercostal nerve then descends along the thorax; it lies upon the heads of the ribs, where they are articulated with the vertebræ; it receives additional branches from all the dorsal nerves, and in each intercostal space it forms a ganglion. This nerve may be dissected with greater facility when the lungs are removed, and the ribs sawed off near the spine, which will enable the dissector to trace its branches more fully. It lies behind the pleura, but is seen through it; it passes into the abdomen by the side of the spine, running through the fibres of the small muscle of the diaphragm.

BRANCHES OF THE INTERCOSTAL IN THE THORAX.

The ANTERIOR INTERCOSTAL, or SPLANCHNIC NERVE, should be attended to. It is formed by three or four twigs, which come off from the intercostal betwixt the fourth and eighth dorsal vertebræ; these

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twigs, passing forward on the bodies of the vertebræ, unite to form the splanchnic nerve, which may be traced entering the abdomen, betwixt the crura of the small muscle of the diaphragm.

From the intercostal also, twigs are given off, which assist the branches of the par vagum, and of the dorsal nerves, in forming several plexuses to supply the viscera of the thorax.

The right intercostal nerve lies under the pleura by the right side of the spine. Still nearer the middle of the spine, you see the VENA AZYGOS. In dissecting it is found situated betwixt the right intercostal nerve and the aorta; it begins below from ramifications of the lumbar arteries, which pierce the small muscle of the diaphragm. This vein ascends along the spine, receiving veins from each of the intercostal spaces of the right side, and, about the middle of the back, it receives a considerable trunk, which comes from under the aorta, and returns the blood from the left side of the thorax. At the fourth dorsal vertebra, the vena azygos leaves the spine; it makes a curve forward, and empties its blood into the back part of the vena cava superior, immediately before that vein enters the pericardium.

Descending through the posterior mediastinum, will be also found the AORTA. This great artery, having formed its arch, comes in contact with the third dorsal vertebra, and is now called the Descending Aorta, or Thoracic Aorta. It descends along the bodies of the dorsal vertebræ, rather on their left side; it lies behind the œsophagus, and passes betwixt the crura of the diaphragm into the abdomen.

BRANCHES OF THE AORTA IN THE THORAX.

1. A. INTERCOSTALES INFERIORES.—The arteries which supply the three or four superior intercostal spaces, generally come off in one common trunk, which afterwards subdivides.

The Intercostalis Superior, on the right side, is mostly sent off by the subclavian; on the left side, by the aorta.

The Inferior Intercostals are eight or nine in number on each side of the thorax; they come off separately from the side or back part of the aorta, and seem to tie that great artery to the spine. Each intercostal artery passes immediately into the interval betwixt two ribs, and there subdivides into,

(1.) A branch which perforates between the heads of the ribs to the muscles of the back; this branch also gives twigs which enter the spinal canal.

(2.) The continued trunk of the artery runs forwards, in the interval of the two ribs, giving many branches to the intercostal muscles. When it reaches the anterior part of the thorax, it is lost in the muscles.

Each intercostal artery is accompanied by one or two veins, branches of the vena azygos, and by an intercostal or dorsal nerve.

2. A. Bronchiales are two, sometimes three, small twigs of the aorta, one of which passes to the lungs on each side; they sometimes arise from the subclavian and superior intercostal.

3. Small arteries pass forwards from the aorta on the œsophagus, named A. Œsophageæ; others run to the pericardium and pleura.

The dissector also finds in the posterior mediastinum the Thoracic Duct. He must look for it behind the œsophagus, betwixt the vena azygos and aorta; it is collapsed, and appears like cellular membrane condensed, and can only be distinguished when inflated or injected; it was seen in the abdomen close to the aorta, and passing into the thorax between the crura of the diaphragm. It ascends along the posterior mediastinum, and, about the fourth dorsal vertebra, passes obliquely to the left side, behind the aorta

descendens, and behind the great arch of the aorta, until it reaches the left carotid artery. It runs behind this artery, and behind the left internal jugular vein; and, after forming a circular turn or arch (the convexity of which is turned upwards,) it descends, and enters the left subclavian vein at the point where that vein is joined by the left internal jugular. In its course along the spine, the thoracic duct frequently splits into two branches, which re-unite. The absorbents of the right superior extremity, and of the right side of the head and thorax, usually form a trunk, which enters the right subclavian vein.

The ŒSOPHAGUS is also situated betwixt the layers of the posterior mediastinum. It lies immediately before the aorta, but rather towards its left side; it is seen descending from the neck behind the trachea; it passes through an opening in the lesser muscle of the diaphragm, and immediately expands into the stomach.

Behind the trachea and vessels going to the lungs, and on the fore part of the œsophagus, we meet with a congeries of lymphatic glands.

COURSE OF THE PAR VAGUM, OR EIGHTH PAIR OF NERVES, IN THE THORAX.

From the neck, the par vagum passes betwixt the subclavian vein and artery into the thorax; it immediately sends off a large branch, the RECURRENT NERVE, back into the neck. On the right side, this branch twists round under the arteria innominata; on the left side, under the arch of the aorta, it ascends behind the carotid, and lodges itself betwixt the trachea and œsophagus, to both of which it gives branches.

The par vagum, having given off the recurrent, descends by the side of the trachea, and behind the root of the lungs. It here sends off numerous filaments to the lungs, which, uniting with twigs from

the great sympathetic, form the ANTERIOR and POS-
TERIOR PULMONARY PLEXUSES; these plexuses lie on
the anterior and posterior surfaces of the root of the
lungs. Other twigs of the par vagum pass, to form
the inferior CARDIAC PLEXUS about the pericardium.

The trunk of the eighth pair soon reaches the œso-
phagus; the left par vagum runs on the fore part of the
œsophagus, the right nerve on its back part. Here
they split into several branches, which unite again,
and form a PLEXUS. This plexus is called the ŒSOPHA-
GEAL. The two nerves continue their course along the
œsophagus, and pass with it through the diaphragm,
to ramify on the stomach, and form the stomachic
plexus.

The twelve dorsal or intercostal nerves are also
seen in this dissection, emerging from the spinal canal,
between the bodies of the vertebræ, and supplying
the intercostal muscles, &c.

OF THE VESSELS AND NERVES
OF THE FACE.

ARTERIES.

THE A. MAXILLARIS EXTERNA, the third branch
of the carotid, comes from the neck over the lower
jaw at the anterior edge of the masseter. It then runs
under the depressor anguli oris, passes towards the
angle of the mouth, and is often much contorted. Here
it is named the A. Facialis or Angularis. It ascends
by the side of the nose, and, reaching the inner angle
of the eye, is lost on the muscles situated there, inos-
culating freely with the temporal, internal maxillary,
and ophthalmic arteries. In this course it gives off
many branches: 1. Twigs to the masseter, depressor

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anguli oris, and chin; 2. A. CORONARIA LABIORUM.
This artery is very much contorted.—At the angular
commissure of the lips, it divides itself into two
branches, which run along the superior and inferior
portions of the orbicularis oris, and join the same
branches of the other side.   3. While the facial
artery ascends by the side of the nose, it gives off the
external nasal arteries to the outside of the nose, and
the A. Buccales to the cheek.

The External Carotid is found ascending behind
the parotid gland. It perforates the gland at its upper
part, ascends over the zygomatic process immediately
before the ear, and divides into the anterior, middle,
and posterior temporal arteries, which ramify over
the side of the head, giving also branches to the fore-
head and occiput.

But the carotid, while it lies embedded under the
parotid, sends several twigs to the substance of that
gland, and a considerable artery which passes for-
wards, and, ramifying on the side of the face, is named
A. TRANSVERSALIS FACIEI.   At this point also, the
carotid sends off a large artery, the A. MAXILLARIS
INTERNA.   As many branches of this artery are met
with in the dissection of the face, it is proper to give
a view of its distribution.

The Internal Maxillary passes behind the condyloid
process of the lower jaw: it directs its course towards
the bottom of the orbit of the eye; and it is at this point
that it sends off its numerous branches. (1.) ARTERIA
MEDIA DURÆ MATRIS (or Meningea spheno-spinalis
or spinosa) passes through the spinal hole of the sphe-
noid bone into the cranium, and is distributed to the
dura mater.   (2.) A. MAXILLARIS INFERIOR, vel
Dentalis Inferior, runs downwards, enters the foramen
at the root of the ascending processes of the lower
jaw; then passes through the canal of the lower jaw,
supplying the teeth and sockets, and emerges by the

foramen mentale, to be distributed to the chin. It is accompanied by a nerve and one or two veins. (3.) A. Pterygoideæ and A. Temporales Profundæ, are small branches of the internal maxillary which pass to the pterygoid muscles, and to the inner part of the temporal muscle. (4.) A. Pharyngeæ, branches to the pharynx, palate, and base of the skull. (5.) A. Alveolaris, which gives branches to the teeth of the upper jaw, and to the jaw-bone itself. (6.) A Branch through the foramen spheno-palatinum to the nose; and, (7.) An Artery through the palato-maxillary canal to the palate.

The continued trunk of the internal maxillary enters the orbit by the spheno-maxillary slit. It sends off a branch which runs along the inner side of the orbit, and passes out at the inner canthus of the eye on the forehead. The artery itself runs along the bottom of the orbit in a canal on the upper part of the great tuberosity of the os maxillare superius, and emerges by the foramen infra-orbitarium on the face; hence it is termed A. Infra-Orbitaria, and is distributed to the cheek and side of the nose.

The FRONTAL ARTERY is also seen in the dissection of the face, passing from the orbit through the foramen supra-orbitarium to be distributed to the forehead. This artery is sent off from the ophthalmic artery, which is a branch of the internal carotid.

If the face be injected, a remarkable anastomosis of arteries will be observed at the inner angle of the eye.

VEINS.

The veins of the face are numerous, and pass into the external and internal jugular veins.

NERVES.

1. The PORTIO DURA of the seventh pair, Nervus Communicans Faciei, or Facial Nerve, after its course through the temporal bone in the aqueduct of Fallopius, comes out by the foramen stylo-mastoideum. It immediately gives off branches to the neighboring parts, as behind the ear. It then passes through the substance of the parotid gland, and emerges on the face in three great branches, which have frequent mutual communications: this division of the nerve is called PES ANSERINUS.

(1.) The ascending branch ramifies on the temple and forehead.

(2.) The middle branch sends its ramifications over the side of the face, the proper Facial Nerves.

(3.) The descending branch sends its twigs along the chin, down upon the neck, and backwards upon the occiput.

2. The SUPERIOR CERVICAL NERVES send off several branches, which ramify on the side of the face and head, and communicate freely with the branches of the portio dura.

As, in the course of this dissection, we meet with many twigs of the second and third branches of the fifth pair of nerves, it will be advisable here to describe these nerves.

3. NERVUS MAXILLARIS SUPERIOR, or Second Branch of the Fifth Pair. The superior maxillary nerve, having left the cranium by the foramen rotundum of the sphenoid bone, emerges behind the antrum maxillare, at the lower back part of the orbit, and at the root of the pterygoid process of the sphenoid bone. It immediately sends out branches: 1. A small branch which passes through the spheno-maxillary slit to the periosteum and fat of the orbit. 2. The largest branch is the INFRA-ORBITARY NERVE. It enters

the channel in the top of the antrum maxillare, accompanying the infra-orbitary artery, comes out at the foramen infra-orbitarium, and is widely distributed to the cheek, under lip, and outside of the nose, communicating with ramifications of the portio dura. 3. Branches to the temporal muscle, os malæ, &c. 4. Other branches form a small ganglion at the root of the orbit, which sends twigs, named the superior Nasal Nerves, through the foramen spheno-palatinum to the nose. 5. The Vidian Nerve, which enters the foramen pterygoideum, and passes again into the cranium, to connect itself with the portio dura. 6. The Palatine Nerve, which runs through the palato-maxillary canal to the palate. 7. Twigs which supply the gums and alveoli of the upper jaw.

4. Nervus Maxillaris Inferior, or Third Branch of the Fifth Pair. The inferior maxillary nerve leaves the cranium by the foramen ovale of the sphenoid bone. It has its course downwards and outwards; and, having given twigs to the parts near which it passes, as the masseter, pterygoid, and temporal muscles, it divides at the angle of the lower jaw into two branches. 1. The Nervus Dentalis Inferior enters the foramen at the angle of the lower jaw; accompanies the inferior dental artery along the canal in that bone, giving nerves to the teeth; emerges by the foramen mentale, and is distributed to the chin. 2. The Nervus Gustatorius, vel Lingualis, passes to the tongue. It was seen in the dissection of the neck lying close upon the lower jaw-bone, below the inferior edge of the pterygoideus internus, and above the superior fibres of the mylo-hyoideus. It supplies the substance of the tongue, and the salivary glands situated at the root of the tongue.

This nerve receives the chorda tympani, a small twig which comes from the seventh pair through the slit in the articulating cavity of the temporal bone.

5. In the dissection of the face, we also meet with the FRONTAL NERVE; which comes from the first branch of the fifth pair, and which is seen accompanying the frontal artery through the foramen supra-orbitarium. It is distributed to the forehead.

OF THE VESSELS AND NERVES MET WITH IN THE ORBIT OF THE EYE.

ARTERIES.

THE OPHTHALMIC, or OCULAR ARTERY, is a branch of the internal carotid. It enters the orbit from the basis of the cranium by the foramen opticum. It gives branches to the lachrymal gland, fat, muscles, and globe of the eye. One twig, named the A. Centralis Retinæ, enters the substance of the optic nerve, and is continued on to the retina;—twigs also pass to the eye-lids, and to the inner angle of the eye. The Arteria Frontalis is a branch of this artery; it is seen running towards the supra-orbitary notch or foramen, and is distributed to the forehead.

The INFRA-ORBITARY ARTERY is found in the lower part of the orbit; it is the continued trunk of the internal maxillary, entering the orbit by the spheno-maxillary slit. It is seen passing along the canal in the upper part of the great tuberosity of the os maxillare superius, and emerges on the face by the infra-orbitary hole.

VEINS.

These correspond with the arteries; they discharge their blood partly into the branches of the external jugular vein near the forehead and temples, and partly into the internal jugular.

NERVES.

1. The OPTIC NERVE is seen coming through the foramen opticum, and entering the back part of the globe of the eye, to form the retina.

2. The Nerve of the Third Pair, MOTOR OCULI, having entered the orbit through the superior orbitary fissure, or foramen lacerum, is divided into four branches.

(1.) The first runs upwards, and subdivides into two nerves, of which one supplies the levator oculi, and the other the levator palpebræ superioris.

(2.) The second branch goes to the depressor oculi, and is short.

(3.) The third branch supplies the obliquus inferior, and also gives off a twig, which assists in forming the lenticular ganglion.

(4.) The fourth branch supplies the adductor oculi.

3. The Nerve of the Fourth Pair, N. PATHETICUS, or Trochlearis, enters the orbit by the superior orbitary fissure, and runs to the obliquus superior.

4. The first branch of the Nerve of the Fifth Pair, named OPHTHALMIC, or Orbitary, enters the orbit by the superior orbitary fissure, and divides into three branches.

(1.) The FRONTAL, Supra-orbitary, or Superciliary Nerve, accompanies the frontal artery along the upper part of the orbit, close to the bone; and having passed through the supra-orbitary notch, is distributed to the forehead.

(2.) The NASAL Nerve, or inner branch, runs towards the nose, and is distributed to the inner side of the orbit, and to the nose.

(3.) The Temporal or Lachrymal Branch supplies the lachrymal gland, and the parts at the outer side of the orbit.

The LENTICULAR GANGLION is a small ganglion,

situated within the orbit, formed by short branches of the ophthalmic nerve, and by a twig of the third pair. It sends off delicate nerves which run along the sides of the optic nerve, and pierce the coats of the eye.

5. The second branch of the Fifth Pair, called the SUPERIOR MAXILLARY NERVE, sends off a branch through the bony canal in the bottom of the orbit. This is the INFRA-ORBITARY NERVE. It accompanies the artery of the same name, and emerges on the face by the infra-orbitary hole.

6. The Trunk of the Sixth Pair of Nerves passes through the superior orbitary fissure to the abductor oculi.

These delicate nerves are surrounded by the adipose substance found in the orbit, and require to be dissected with the utmost care.

DISSECTION OF THE CUTANEOUS VESSELS AND NERVES OF THE SHOULDER AND ARM.

In removing the integuments, we meet with several cutaneous veins and nerves.

The cutaneous veins* of the upper extremity are the following.

1. The BASILIC VEIN is seen arising from a small vein on the outside of the little finger, named Salvatella. It then runs along the inside of the fore arm near the ulna, receiving the internal and external ulnar veins from the anterior and posterior surface of the fascia. It passes over the fold of the arm near the inner condyle of the humerus; here it is superficial.

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* The veins are described from their origin in the fore arm, for the sake of perspicuity; they ramify above the fascia of the fore arm.

It ascends along the arm, becoming more deeply seat-
ed, and included in the sheath which invests the
brachial artery. As it approaches the neck of the
humerus, it sinks deep betwixt the folds of the arm-
pit, and terminates in the axillary vein, which may be
considered as a continuation of the basilic vein. It
communicates with the deeper-seated veins, and
receives numerous branches from the muscles.

2. The CEPHALIC VEIN begins on the back of the
hand, between the thumb and metacarpal bone of the
fore-finger, by a small vein, named Cephalica Pollicis.
It runs along the radius between the muscles and
integuments, receiving the internal and external radial
veins. It passes over the bend of the arm near the
external condyle, and ascends along the outside of the
arm near the outer edge of the biceps flexor cubiti.
It then runs betwixt the edge of the deltoid and pec-
toral muscles, dips down under the clavicle, and enters
the subclavian vein. In all this course, the cephalic
vein receives branches.

3. The MEDIAN VEIN. Several veins are seen
running along the middle of the anterior part of the
fore-arm. The trunk formed by these veins is called
the Mediana Major. It ascends on the flat part of the
fore arm, betwixt the basilic and cephalic veins, and
bifurcates at the fold of the arm into two branches:
1. The Mediana Basilica, passing off obliquely to join
the basilic vein; 2. The Mediana Cephalica, which
joins the cephalic.

The cutaneous nerves of the arm are seen ramifying
above the muscles; they consist of,

1. The Internal Cutaneous Nerve, a branch of the
axillary plexus. It is seen accompanying the basilic
vein, and twisting its fibres over it. It descends along
the inside of the arm, crosses over the fore part of
the elbow-joint, and, in the dissection of the fore arm,
will be seen dividing itself into twigs, which ramify

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between the fascia and integuments, and are distri-
buted to the inside of the fore arm and wrist.

2. The upper part of the arm receives cutaneous
nerves from the branches of the dorsal nerves, which
come out of the thorax between the ribs.

3. The shoulder and back part of the scapula
receive twigs from the cervical nerves.

4. The external cutaneous, ulnar, and spiral nerves,
also send twigs to the integuments of the arm and
fore arm.

The relative situation of the vessels at the bend of
the arm should be well attended to. The cutaneous
veins situated here vary much in size. The vena
basilica is seen running over the fore part of the bend
of the arm near the inner condyle, the vena cephalica
situated near the outer condyle; and each of these
veins receives a branch passing obliquely from the
vena mediana major. These vessels lie above the
fascia, while the brachial artery lies deep beneath the
fascia, in a hollow resembling that of the axilla. It
descends over the joint near the inner condyle, on the
inside of the tendon of the biceps flexor cubiti, and
under the aponeurosis sent off from that muscle to the
common fascia of the fore arm. It lies embedded in
cellular substance, betwixt the pronator teres and
flexor muscles of the wrist and fingers on one side,
and the supinator longus and extensor muscles on the
other. In this hollow it divides into the radial, ulnar,
and interosseal arteries. The artery is accompanied
by two veins, and on its inner side runs the radial
nerve.

OF THE VESSELS AND NERVES OF THE SUPERIOR EXTREMITY.

ARTERIES.

THE subclavian and axillary arteries have already been described.

The BRACHIAL ARTERY may be said to have its course along the inside of the arm. Having left the axilla, it runs along the inferior edge of the coraco-brachialis. Rather higher up than the middle of the os humeri, it crosses over the tendinous insertion of that muscle, being here situated between the belly of the biceps flexor cubiti, and the superior fibres of the brachialis externus. The artery then passes behind the inner edge of the biceps flexor cubiti, descending betwixt that muscle and the fibres of the brachialis internus. In dissecting this vessel, we find it invested by a fascia or sheath, formed by cellular membrane and some tendinous fibres. This fascia may be traced extending from the internal intermuscular ligament. It covers the brachial artery and radial nerve; and the great basilic vein, as it enters into the axilla, is found lying in the fore and inner part of this sheath. It supports and connects these vessels. On dissecting this fascia, we find, close to the margin of the coraco-brachialis and biceps flexor cubiti, the great radial nerve; under it the brachial artery; and, more superficially seated, the venæ comites and the vena basilica. As the artery approaches the lower extremity of the os humeri, it inclines forwards toward the fold of the arm, and dives beneath the aponeurosis which arises from the inside of the tendon of the biceps flexor cubiti. Its situation at the fold of the arm has been described.

BRANCHES OF THE BRACHIAL ARTERY.

1. A. Profunda Humeri Superior, or Muscularis Superior, is sent off from the inner side of the brachial artery, immediately where it has left the fold of the arm-pit. It passes downwards and backwards round the os humeri, and is accompanied by the muscular or spiral nerve. It passes betwixt the brachialis externus and short head of the triceps extensor cubiti. Here it lies deep among the muscles, and divides into two branches. One accompanying the nerve spreads its ramifications over the outer condyle, and anastomoses with the arteries below the elbow. The other branch is distributed along the inside of the arm, and about the inner condyle.

2. A. Profunda Humeri Inferior, vel Minor, or Muscularis Inferior, is smaller than the last, and is sent off from the brachial artery about two inches lower down. It descends among the muscles on the inside of the arm, and is lost about the inner condyle.

3. The anastomosing or collateral arteries are as follows.

(1.) The Ramus Anastomoticus Major passes from the inside of the brachial artery, about two or three inches above the inner condyle. It is distributed about the condyle; and its principal branch accompanies the ulnar nerve in the groove betwixt the olecranon and inner condyle, to anastomose with the recurrent branches of the arteries of the fore-arm.

(2.) There are two or three more anastomosing branches, which are sent off from the brachial artery, and ramify over the anterior and posterior surfaces of the two condyles.

4. Small branches to the muscles of the arm.

The Brachial Artery, where it lies deep under the aponeurosis of the biceps, divides into three branches. 1. The radial; 2. The ulnar; and, 3. The interosse-

ous artery. The last two generally come off by one trunk, which subdivides.

1. ARTERIA RADIALIS, the radial artery, is smaller than the ulnar, and in its course more superficial. It leaves the ulnar artery, and inclines towards the radial or outer edge of the fore-arm. At first it lies betwixt the pronator teres and supinator longus. It then descends close along the inner edge of the supinator longus, and about the middle of the fore-arm passes over the insertion of the pronator teres. It then holds its course betwixt the supinator longus and flexor carpi radialis, and is accompanied by a branch of the muscular or spiral nerve. In this situation the artery continues its course along the radius, till, reaching the lower extremity of that bone, it divides into two branches.

(1.) Ramus Volaris, A. SUPERFICIALIS VOLÆ, is by much the smaller of the two branches. It passes into the muscular mass which forms the ball of the thumb, and spreads its ramifications on the palmar fascia, the annular ligament of the wrist, and muscles of the thumb, anastomosing with the ramifications of the superficial palmar arch.

(2.) The trunk of the radial artery crosses over the lower extremity of the radius to the back of the hand. It passes under the extensors of the thumb, over the os scaphoides and the junction of the os trapezium and trapezoides, and, arriving at the space betwixt the bases of the metacarpal bones of the thumb and fore-finger, plunges into the palm of the hand.

The branches of the radial artery, in its course along the fore-arm, are the following.

(1.) The recurrent artery is sent off from the radial immediately after it leaves the ulnar artery, and is distributed over the anterior part of the outer condyle,

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where it anastomoses with branches of the brachial artery.

(2.) Small arteries to the muscles of the fore-arm, and to the radius.

(3.) A branch leaves the artery immediately after it has turned over the edge of the radius, and, ramifying on the back of the hand, is named Dorsalis Carpi.

(4.) Small vessels are sent off to the back part of the thumb, named A. Dorsales Pollicis.

Having reached the palm of the hand, the radial artery divides into two branches.

(1.) A. Pollicis, which sends two or three arteries along the anterior part of the thumb, and also often gives off a twig, the A. Radialis Indicis, which passes along the outer edge of the fore-finger, and inosculates with a branch of the ulnar artery.

(2.) The trunk of the radial artery forms the DEEP-SEATED PALMAR ARCH. From the root of the thumb, it passes across the metacarpal bones near their bases, and terminates at the metacarpal bone of the little finger, inosculating with a branch of the ulnar artery. This arch lies deep, close to the bones. It supplies the interosseous muscles and deep-seated parts of the palm, and some of its branches pass betwixt the metacarpal bones to the back of the hand.

2. ARTERIA ULNARIS, or Cubitalis. The ulnar artery is the largest branch of the brachial, and generally gives off the interosseous artery. It takes its course deep among the muscles on the inside of the fore-arm. It is seen passing under the pronator teres, flexor carpi radialis, palmaris longus, and flexor sublimis perforatus, but over the flexor profundus perforans. It descends in the connecting cellular membrane between the flexor sublimis and profundus; but about the middle of the fore-arm, it emerges from these muscles, and appears at the ulnar edge of the arm,

betwixt the flexor sublimis and flexor carpi ulnaris.
It passes over the annular ligament of the wrist, which
binds down the flexor tendons of the fingers, but is
covered by the fascia which ties down the tendon of
the flexor carpi ulnaris. It passes under the palmar
aponeurosis, on the inside of the os pisiforme, reaches
the base of the metacarpal bone of the little finger,
and begins to form the SUPERFICIAL PALMAR ARCH.
This arch lies above the tendons of the flexor sublimis
perforatus, immediately beneath the palmar aponeu-
rosis. It crosses the metacarpal bones betwixt their
bases and the middle of their bodies. It begins at the
root of the little finger, and terminates at the root of
the thumb, in inosculations with the branches of the
radial artery. The convex side of the arch is turned
towards the fingers, and sends off five branches.

(1.) A branch to the muscles and inner edge of the
little finger.

(2.) Ramus digitalis primus, or the first digital ar-
tery, which runs along the space betwixt the two last
metacarpal bones, and bifurcates into two branches,
one to the outer side of the little finger, and the other
to the inner side of the ring finger.

(3.) The second digital artery, which bifurcates in
a similar manner, and supplies the outer edge of the
ring finger, and the inner side of the middle finger.

(4.) The third digital artery, which is distributed
to the outer edge of the middle finger, and to the inner
side of the fore finger.

(5.) The ramus pollicis ulnaris is the last branch
of the ulnar artery, and is sent to the muscles of the
thumb.

From the concavity of the arch are sent off the in-
terosseous arteries of the palm, small twigs which
supply the deep seated parts, and perforate betwixt
the metacarpal bones to the back of the hand.

The branches of the ulnar artery, in its course along the fore-arm and wrist, are the following.

(1.) The RECURRENT ARTERIES are two in number. They are sent off from the ulnar artery immediately below the elbow, sometimes in one common branch, which subdivides. The anterior recurrent runs over the fore part of the inner condyle; the posterior re-current passes over the back part. These arteries inosculate with branches of the brachial.

(2.) Twigs to the muscles of the fore-arm.

(3). A. Dorsalis Carpi is sent off from the ulnar artery a little above the wrist to the back of the hand. Twigs are also given off to the annular ligament and neighboring parts.

(4.) A. PALMARIS PROFUNDA is sent off from the ulnar artery, where it descends on the inside of the os pisiforme. It passes into the flesh at the root of the little finger, and inosculates with the termination of the deep seated palmar arch of the radial artery.

3. ARTERIA INTEROSSEA (or Interossea Communis.) This artery is generally sent off from the ulnar. It immediately divides into two branches:

(1.) The external or posterior interosseous artery is the smaller branch. It passes through the upper part of the interosseous ligament, to supply the mus-cles on the posterior part of the fore arm. It sends off the A. Recurrens Interossea, which ramifies on the middle of the back part of the elbow joint.

(2.) The internal or anterior interosseous artery descends close upon the middle of the interosseous ligament, between the flexor longus pollicis and flexor profundus perforans, giving twigs to the adjacent muscles. Arriving at the upper edge of the pronator quadratus, it perforates betwixt the radius and ulna to the back part of the arm, and spreads its extreme branches on the wrist and back of the hand.

VEINS.

The cutaneous veins have been already described.

The brachial artery is accompanied by two veins, named Venæ Comites, or Satellites. These receive branches corresponding to the ramifications of the artery.

NERVES.

In the dissection of the axilla, we demonstrated the great axillary plexus, and traced its first two branches, the external scapular and circumflex nerves. The distribution of the five remaining branches of the plexus must now be described.

(3.) The EXTERNAL CUTANEOUS NERVE (Musculo-cutaneus, or Perforans Casserii) is the third branch of the axillary plexus. It passes through the belly of the coraco-brachialis muscle. After its passage, it continues its course obliquely across the arm, betwixt the Biceps flexor cubiti and the Brachialis internus. It gives twigs to these muscles, and appears as a superficial nerve on the edge of the supinator longus. It runs over the outer condyle, and is distributed to the integuments on the outside of the fore arm, and back of the hand.

(4.) The RADIAL (or Median) NERVE accompanies the brachial artery to the bend of the elbow, and is contained in the same sheath as the artery. In its passage down the arm, it lies before that vessel, but at the elbow is situated on its inside. It gives off no branches until it has sunk under the aponeurotic expansion of the biceps flexor. Here it distributes many nerves to the muscles of the fore arm, to the pronator teres, flexor carpi radialis, the flexors of the thumb and fingers, and the pronator quadratus. The trunk of the nerve perforates the pronator teres, passes betwixt the flexor digitorum sublimis and flexor profun-

dus, and continues its course betwixt these muscles down to the wrist. Near the wrist it becomes more superficial, lying amongst the tendons of the flexors, and before it descends under the annular ligament, sends a superficial branch to the integuments, and the short muscles of the thumb. The nerve itself passes with the flexor tendons of the fingers under the annular ligament of the wrist, emerges from these tendons, and appears on their outside, near the root of the thumb. It ramifies superficially in the hand, sending off four branches. The first branch passes to the thumb; the second to the side of the fore finger next the thumb; the third divides into two nerves, of which one passes to the inner side of the fore finger; the fourth also subdivides into two, to the inside of the middle finger, and outer side of the ring-finger. These nerves pass before the flexor tendons, but behind the superficial palmar arterial arch, to reach the fingers.

(5.) The ULNAR NERVE descends along the inside of the arm. It is at first situated immediately under the integuments, but below the middle of the arm is tied down by the intermuscular ligament which passes to the inner condyle of the humerus. The nerve becomes here more deeply seated; it runs between the inner condyle in the hollow behind it and the olecranon, and in the flesh of the brachialis externus or third head of the triceps extensor. After passing the condyle, it continues its course betwixt the two heads of the flexor carpi ulnaris, till it reaches the ulnar artery. It then accompanies the ulnar artery, lying on its inside, and running along the fore arm between the flexor ulnaris and flexor digitorum sublimis. It sends twigs to the neighboring muscles, and, when arrived near the wrist, divides into two branches. 1. The Smaller Branch, called Ramus Posticus, passes under the tendon of the flexor carpi ulnaris, and over the lower end of the ulna, to be distributed to the back

of the hand, and of the little and ring-fingers. 2. The
continued trunk of the nerve passes, on the inside of
the ulnar artery, over the annular ligament of the
wrist. It passes under the palmar aponeurosis, and
divides into three principal branches. The first sup-
plies the integuments and muscles on the ulnar edge
of the hand, and the inner side of the little finger.
The second is distributed to the outer side of the little
finger, and inner side of the ring-finger. The third
branch passes deep under the long tendons, accompa-
nies the deep seated palmar arch, and terminates in
the short muscles of the thumb and fore finger, com-
municating with the radial nerve.

(6.) The MUSCULAR or SPIRAL NERVE (RADIAL
of some anatomists) passes from the axilla behind the
os humeri, making a spiral turn round the bone to
reach the outside of the arm. It first descends be-
tween the brachialis externus and short head of the
biceps extensor cubiti, accompanying the arteria pro-
funda humeri superior, and passing deep into the flesh
of the arm. Before it makes this turn, it gives branches
to the muscles, also a cutaneous branch, which de-
scends on the inside of the arm. From the back part
of the arm the great trunk of the nerve is reflected
spirally forwards. It is seen emerging betwixt the
supinator longus and brachialis internus, seated deep
and close to the bone. It descends betwixt these
muscles, keeping close to the edge of the supinator
longus. Immediately after passing the fold of the
arm, it sends off a nerve, which descends, superficial,
upon the radial edge of the fore arm, as far as the
wrist; and, at this point, the trunk of the muscular
nerve divides itself into two branches. The first, a
large branch, perforates the supinator brevis, and
supplies the extensor muscles of the hand and fingers.
The second branch accompanies the supinator longus
down the fore arm, and near the wrist turns under the

tendon of that muscle, over the edge of the radius. It then divides into several branches, which ramify on the back of the wrist, thumb, and fore finger.

(7.) The INTERNAL CUTANEOUS NERVE descends superficial, along the inside of the arm and fore arm. It was described among the cutaneous nerves of the arm.

THE METHOD OF INJECTING THE ARTERIES.

FOR the student, who desires to obtain a general view of the arteries, it will be sufficient to inject them from the arch of the aorta. For this purpose an incision is to be made through the integuments along the centre of the sternum throughout its whole length; and the sternum divided longitudinally with a saw: then lay open the thorax by bending back the two portions of the sternum. An incision is then to be made into the pericardium, and a small opening in the ascending arch of the aorta; into which a pipe is to be inserted and well secured.

For ordinary purposes, the injecting material may consist of a strong heated solution of glue and colouring matter.

When any particular part of the body alone is to be injected, it is necessary to introduce the pipe into the artery which supplies that particular member: thus, if the head is to be injected, a pipe is to be introduced into each common carotid, or, what is preferable, one pipe with a bifurcation, and the vertebral arteries are to be secured with a ligature. If an arm, insert the pipe into the axillary artery; and for the lower extremity, fix the pipe in the common iliac artery according to the side to be injected.

METHOD OF INJECTING THE HEART AND GREAT VESSELS.*

If we wish to inject the heart while it is in its natural situation, we must sacrifice almost all the parts of the chest to it; for it is a preparation so difficult to make, and so expensive, that when we undertake it, we must not hesitate to destroy the other parts. The chest, for this purpose, is to be opened by cutting through the sternum in its length, and by bending back the lateral portions. The abdomen must also be opened. The viscera are to be pulled down, so that a large pipe may be put into the aorta, where it lies between the crura of the diaphragm. Another pipe is to be put into the vena cava ascendens, below the liver.

We must then make a dissection on each side of the neck, so as to expose the internal jugular veins, into each of which, a pipe should be put. The carotid and vertebral arteries are to be tied; so are the subclavian: or perhaps it will be better to put tight ligatures on the arms, just below the insertion of the pectoralis major.

Previous to the injection of the veins, a quantity of warm water should be thrown into them, so that it may pass into the several cavities of the heart. The water is then to be pressed out along with the coagula which are generally found in the cavities of the heart. It is principally upon this being carefully done, that a good injection of the heart depends.

When the parts are thoroughly heated, the *red* injection should be thrown into the ascending aorta. An assistant must now be ready to *knead* the injection through the valves of the aorta; (but, if possible, a probe should have been passed from the carotid,

* Shaw's Manual.

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before it was tied, to break down these valves;) when the injection once passes the valves, it will quickly distend the left ventricle, which must be supported by the assistant,—the pericardium having been previously opened. By a little pressure, the wax will pass into the left auricle, and, from it, into the pulmonary veins. It will be well to make a small puncture, with a lancet, in the apex of the ventricle, to allow the escape of any water or blood which may be still in this side of the heart.

The right side of the heart may be filled with blue or yellow injection from the pipes which have been put into the several veins. It will be necessary to make a puncture in the apex of the auricle, to permit the exit of a certain quantity of water which will be left in the heart, even though much care has been taken to squeeze it all out previous to the injection.

Perhaps the vena azygos may be filled, with the other veins; but if it be not, we must put a pipe into it, and inject it separately.

The thoracic duct may also be injected. If sought for in the abdomen, it will be discovered at the root of the mesenteric vessels, or between the right crus of the diaphragm and the aorta. It may be traced up under the diaphragm, along with the aorta, and upon its right side, close to the spine. As it generally lies collapsed and undistinguishable, it may be raised by blowing into some of the glands upon the root of the mesentery, or into those upon the course of the external iliac vessels, or even into those below Poupart's ligament in the groin. It must be injected with a different color from the veins, that it may not be confounded, in the thorax and at the root of the neck, with their branches.

When the heart only is to be injected, we should cut through the vessels going to the upper parts of the body, as they are emerging from the thorax, and remove the heart and lungs, by tearing them, along

with the trachea and œsophagus, from the spine,—making first an incision along the spine, to free the intercostal arteries. We may then cut through the aorta and vena cava, below the diaphragm:—a part of the liver should be left attached to the vessels. It is necessary to remove the heart in this manner, that there may be no danger of cutting any of the great vessels.

We should press out as much blood as possible from the vessels, and then put a pipe into one of the pulmonary veins, and another into the vena cava superior. Having injected warm water by these tubes, to clear the heart of the masses of coagulated blood which are generally found in it after death, we must tie the lungs at their roots, and the vena cava inferior, and all the divided arteries, except the aorta, in which a pipe must be put. If we throw red injection into the pulmonary vein, it will fill the left auricle, left ventricle, aorta, and coronary vessels; but during this part of the injection, an assistant ought to hold and compress the aorta immediately after its giving off the coronary arteries, so as to press the injection on in them; but as by this, the injection will be prevented from entering the aorta, it must be filled from the pipe which was inserted into it. The injection escaping by the intercostal arteries, may be stopped by an assistant throwing cold water on the wax as it flows from the vessels. The yellow injection thrown in by the vena cava superior, will fill the right auricle, ventricle, and pulmonary artery. The dissection required is simply the removing of the soft parts from the injected vessels.

THE LYMPHATIC, OR ABSORBENT SYSTEM.*

THE lymphatic system consists of an elaborate set of vessels, and of a number of glands distributed in various parts in the course of these vessels.

The lymphatic vessels are tubes whose coats are perfectly pellucid, having a remarkable power of contraction. They are called LYMPHATICS, or DUCTUS AQUOSI, from their transmitting a fluid colorless as water. When distended with their fluids, they show that they possess a character distinct from other vessels, being irregularly distended, knotty, presenting sometimes the appearance of a chain of beads, or little irregular vesicles connected together. Everywhere throughout the human body and the viscera, between the extreme branches of the absorbent system and the trunk, glandular bodies are interposed. These glands, though differing in form, are generally of an oval shape, varying in size from the twentieth part of an inch to an inch in diameter. Sometimes they are separate, sometimes accumulated and clustered together. The color of these bodies is various in the several parts of the body; in the outer parts, as in the thigh, axilla, &c., they are redder and stronger; but less so within the abdomen and thorax. In children the lacteal and lymphatic glands are exceedingly numerous, but they shrink with advancing old age.

The function of these glands seems to be to check, control and measure the flow of the absorbed fluids into the mass of the blood, and perhaps also, to produce some modification in the fluid which is conveyed to them. According to Bell, the lymphatics form a system of absorbents which take up the fluids extravasated, or secreted on the surfaces of membranes and cavities. Thus they arise from the pores of the

* Bell's Anatomy.

skin; from the surface of the cavities and viscera, which are covered by the pleura and peritoneum; from the cells of the interstitial and adipose membrane; from all the ducts and cavities of the body. But whether they are the only system of absorbents; whether they carry away all the parts of the system, fluids and solids, whether they absorb the muscles, membranes, bones, tendons, &c., of which the solid body consists, as well as the secreted fluids, are questions which we must leave to the examination of physiologists.

OF THE COURSE OF THE LYM-PHATICS.

THE lymphatics, in their course and relation to the fascia and muscles of the extremities, bear a great analogy to the veins; for there are two sets or grand divisions,—the DEEP LYMPHATICS which accompany the arteries in their branchings among the muscles; and the SUPERFICIAL set which run a course external to the fascia.

OF THE FOOT, LEG AND THIGH.—Even in the toes the same distinction of the origins of the lymphatics may be observed, as in the limb. For while a plexus covers the toes superficially, and runs up upon the foot with the veins, deeper branches accompany the arteries on the side of the toes.

From the toes, dorsum, and edges of the foot, the lymphatics ascend along the leg in four classes. 1. One takes a course from the root of the great toe and inside of the foot, over the tendons of the great toe and tibialis anticus tendon. It then passes on the inside of the tendon of the tibialis anticus muscle, and before the head of the tibia, following the prin-
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cipal branch of the great saphena vein; and then
continues its course, in company with the saphena,
to the inside of the knee. 2. There is at the same
time a considerable number of lymphatics, taking
their origin from nearly the same place, viz. the
inside of the foot, and before the inner ankle; but they
take a different course on the leg from the last class;
for they pass behind the lower head of the tibia: they
attach themselves to some branch of the saphena vein,
and join the former set of vessels on the inside of the
knee. From this they ascend superficially above the
fascia to the glands of the groin. 3. From the out-
side of the foot there ascend several lymphatics; a
division of which passes before the outer ankle and
across the tibia to join the lymphatics, parasites of
the great saphena vein, and here they sometimes form
plexuses and contortions; others turn in behind the
outer ankle, and join the branches accompanying the
lesser saphena vein.

The lymphatics which turn round behind the outer
ankle pass on the outside of the tendo Achillis; and
accompanying the lesser saphena vein, sink into the
popliteal hollow. Here they unite with the lymphatics
which have accompanied the several arteries of the
leg and foot, and particularly the posterior tibial
artery.

The deep lymphatics accompany the arteries, as
we have said; and to inject them we should look for
a very large vessel which is coming out from under
the plantar aponeurosis to rise behind the inner ankle.

POPLITEAL GLANDS.—The glands of the ham-string
cavity are generally three in number, and very small.
They receive some of the lymphatics which pass with
the posterior tibial artery and with the lesser saphena.

From the popliteal glands there ascend two large
lymphatics, which accompany the popliteal artery
and venæ comites, and ascend with the latter through
the adductor magnus to the fore part of the thigh,

They run irregularly, or form a kind of net-work round the great vessels. On the fore part of the thigh, and still deep, they enter the lower and deep inguinal glands.

Sometimes these deep lymphatics, instead of being accumulated into larger trunks, divide into many branches, and only unite in the glands of the groin.

INGUINAL GLANDS.—The inguinal glands are in number from five to ten; they lie involved in cellular membrane on the outside of the femoral ligament. Some of them are superficial and moveable under the integuments; some involved in the laminæ of the fascia, which descend from the abdominal muscles; some are close on the femoral artery and vein, and under the fascia. Nearer to the pubes may be observed a division of these glands which belong to the lymphatics of the penis, perineum, &c.

LYMPHATICS OF THE PARTS OF GENERATION IN BOTH SEXES.—From the penis there run backwards two sets of lymphatics; superficial ones, which take a course to the groin; and deeper ones, which take a course along the arteries of the penis into the pelvis, or under the arch of the pubis. The superficial lymphatics are the cutaneous vessels, and take their origin from the prepuce.

In the external parts of the female there are also two sets of lymphatics. Those near the clitoris pass up in a direction to the ring; and those from the lower part of the vulva and perineum to the glands of the groin.

LYMPHATICS AND GLANDS WITHIN THE LIGAMENT OF THE THIGH.—The vasa efferentia of the inguinal glands are in number from two to six. The deep lymphatics which accompany the femoral vein and artery, lying under the cellular membrane, pass under the ligament, and soon form a large net work of vessels accompanying the iliac vessels, and here they

are joined by the branches of lymphatics from the superficial glands; sometimes the trunks, accompanying the great vessels of the thigh, pass into a gland immediately within the ligament; sometimes one or two of them only enter into the glands high in the loins; nay, sometimes a large vessel passes on directly to the thoracic duct.

From six to eight or ten glands are seated in the tract of the external iliac vessels, under the name of EXTERNAL ILIAC GLANDS. And upon the inside of the brim of the pelvis, and on the hypogastric vessels, the glands are called the INTERNAL ILIAC GLANDS. On the psoas muscle, and on the loins, it is impossible to trace the vessels as single trunks; we may observe that one net-work of vessels ascends upon each psoas muscle from the thigh; and it is there joined by the lymphatics of the pelvis. These vessels are in a manner united to those which cover the prominence of the sacrum, and pass under the bifurcation of the aorta. These two GREAT LUMBAR plexuses of the lymphatics continuing their ascent, many of the vessels enter into the lumbar glands; and on the loins they are joined by the absorbents of the testicle. By the union of the lymphatics ascending from the right and left side, with several large trunks of the lacteals from the root of the mesentery, the thoracic duct is formed on the third and fourth vertebræ of the loins.

OF THE LYMPHATICS OF THE ARM.

In the arm, as in the leg and thigh, there are two sets of lymphatics:—the superficial and the deep-seated. The first of these accompany the cutaneous veins, the latter the deep arteries.

As in general there are too great veins on the fore-arm, the basilic and cephalic veins; but particularly as the veins which gather into the basilic trunk, on the inner and lower edge of the fore-arm, are the

larger and more numerous class; so it is found that the course of the more numerous class of lymphatics is on the lower and inner side of the fore-arm, and that they accumulate about the basilic vein. These are derived from the palm of the hand, and from the ulnar edge of the hand. This set sometimes passes into glands, seated on the brachial artery, near the inner condyle of the humerus.

The absorbents which accompany the cephalic vein arise from the side of the thumb and fore-finger upon the back of the hand; they run on the radial edge of the arm, with the veins which ascend to form the cephalic vein. From the bend of the arm, these vessels take a course on the outer edge of the biceps, and then get between the inner edge of the deltoid, and outer edge of the pectoral muscles; they then pass under the clavicle, and descend into the axillary glands. This set of absorbents receives the branches from the outside of the arm in their whole course.

There are absorbents arising from the back of the hand, next the little finger, which, following some of the branches of the basilic vein, (a larger branch of which is called the ulnaris externa) turn round the ulnar edge of the arm, are inserted into a gland, very commonly found before and a little above the inner condyle of the humerus. From this gland a large lymphatic passes upwards, and attaching itself to the brachial artery, splits and plays around it.

The deep-seated lymphatics of the arm accompany the arteries in the same manner as the venæ comites do; in general, two with each artery. They all terminate in the glands of the axilla, and can require no particular description. The lymphatics, from the muscles and integuments on the back of the shoulder, also turn round and enter into the glands of the axilla.

The GLANDS OF THE ARM are small, and irregularly

placed in the course of the humeral artery, from the condyle to the axilla. They are from three to six in number.

The GLANDS OF THE AXILLA are large and numerous; they receive the lymphatics from the arm, breast, and shoulder; they lie in the deep cavity of the axilla, formed by the tendons of the pectoralis major, and latissimus dorsi muscles. They are embedded in a loose cellular membrane, which, while it surrounds and supports the vessels of the axilla in the motions of the joint, gives them strength from its elasticity. These glands do not all surround the axillary artery; but a lower cluster is attached to the branches of the subscapular artery, going forward on the side of the chest, and to the thoracic arteries.

LYMPHATICS OF THE HEAD AND NECK.

Of the absorbents of the brain, little is known precisely; but none can deny the probability, that the arteries, veins, and lymphatics bear the same relations in the brain as in the other parts of the system. Lymphatic glands are observed in the course of the internal jugular vein, and even in the foramen caroticum, which are understood to belong to the lymphatics of the brain. The lymphatics of the head are to be observed in the course of the temporal and occipital arteries; the latter class terminate in glands, seated behind the mastoid process of the temporal bone. The lymphatics of the face have been observed to be very numerous, accompanying the facial and temporal arteries. But those from the internal parts of the face and nose accompany the internal maxillary artery, and fall into the glands under the parotid, or in the course of that artery. The lymphatics from the gums and jaws accompany the internal maxillary artery, and emerge under the angle of the jaw; and some of them joining the external jugular vein, pass through glands near the top of

the shoulder. The lymphatic vessels from the tongue and parts about the os hyoides, take also the same course.

There are in general several small lymphatic glands, on the side of the face, on the buccinator muscle, immersed in the surface of the parotid gland, and under the zygomatic process. There are also glands to be carefully noted, which lie under the tip of the parotid gland, where it extends behind the angle of the jaw, and also lying under the base of the jaw-bone, close to the sub-maxillary gland, and on the course of the facial artery.

The GLANDS and ABSORBENTS of the neck are very numerous, and the latter form an intricate and beautiful plexus, several branches of which are to be observed accompanying the external and internal jugular veins. Some of the glands lie immediately under the skin, and in the cellular membrane, on the outer edge of the platisma myoides; many under that muscle, and in the course of the external jugular vein. But there are many seated deep, for the greater number accompany the internal carotid artery, and internal jugular vein, or their branches.

The lymphatics of the THYROID GLAND have been raised by Mr. Cruickshanks, by plunging a lancet at random into the substance of the gland, and blowing into it, or throwing quicksilver into its cellular membrane. The trunks of these lymphatics join the thoracic duct on the left side; and on the right side, they unite with the right trunk of the absorbing system, just as it is about to enter the jugular vein.

OF THE TRUNKS OF THE ABSORBENT SYSTEM.

The larger and proper trunk of the lymphatic system is generally called the THORACIC DUCT, because it was first observed by Pecquet* to be a vessel which

* In the year 1651.

conveyed the chyle through the diaphragm, and which took its course through the whole length of the thorax, to discharge its fluids into the veins near the heart. The origin of this great trunk, called the thoracic duct, is the union of the vessels which ascend by the side of the common iliac arteries and veins, and are derived from the pelvis and lower extremities. Upon the third and fourth lumbar vertebræ, and under the aorta, this trunk is frequently joined by a large trunk of the lacteals, and then ascending, it receives the greater number, or the larger trunks of the lacteals. On the vertebræ of the loins, the thoracic duct is by no means regular, either in its course, or size, or shape; often it contracts, and again irregularly dilates, as it seems to emerge from under the aorta. On the uppermost vertebra of the loins, the thoracic duct lies between the right crus of the diaphragm and the aorta. From this point it runs up on the face of the dorsal vertebræ, and between the vena azygos and the aorta. On the fourth dorsal vertebra it passes under the aorta to gain the left side of it. Here it is considerably enlarged, from the contracted state which it assumes in the thorax. Sometimes it splits, and again unites on the vertebræ of the back. Still ascending, it continues to incline to the left side, and may be found by the side of the œsophagus.

The thoracic duct now emerges from the thorax, and lies deep in the lower part of the neck, behind the lower thyroid artery, and on the longus colli muscle.

It rises above the level of the subclavian vein of the left side, and here it receives the absorbents of the head and neck, (of the left side,) and descends again with a curve, and terminates in the angle formed by the union of the subclavian vein and jugular vein of the left side.

Sometimes there are two thoracic ducts; but this

is very rare. Sometimes the duct splits near its termination, and the two branches enter the veins separately; but, in general, when it splits in this manner, it again unites before it terminates in the vein.

There is constantly a trunk in the anterior mediastinum under the sternum, almost as large as the thoracic duct itself, which is sometimes inserted into the termination of the thoracic duct; sometimes into the trunk of the absorbents of the right side, to be immediately described.

THE TRUNK OF THE ABSORBENTS OF THE RIGHT SIDE.

The absorbents, from the right side of the head and neck, and from the right arm, do not run across the neck, to unite with the great trunk of the system; they have an opportunity of dropping their contents into the angle between the right subclavian and the right jugular vein. These vessels then uniting, form a trunk which is little more than an inch, nay, sometimes not a quarter of an inch in length, but which has nearly as great a diameter as the proper trunk of the left side.

The trunk of the right side lies upon the subclavian vein, and receives a very considerable number of lymphatic vessels: not only does it receive the lymphatics, from the right side of the head, thyroid gland, neck, &c., and the lymphatics of the arm; but it receives also those from the right side of the thorax and diaphragm, from the lungs of this side, and from the parts supplied by the mammary artery. Both in this and in the great trunk there are many valves.

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OF THE LACTEALS AND LYMPHATICS OF THE INTESTINAL CANAL.

The lymphatics situated on the alimentary canal are named lacteals,* and both these and the other lymphatics are also termed absorbents.

The lacteals are those lymphatics or absorbents . situated on the intestinal canal, being named so from the commencement of the duodenum to the termination of the rectum. But there are other absorbents which carry the lymph from the tissue of the intestines, and which are simply named lymphatics, although they take the same course. They are subdivided into lactea primi generis, and lactea secundi generis.

The lactea primi generis are those which extend from the intestines to the lymphatic glands situated in the folds of the mesentery; and the lactea secundi generis are those which extend from the lymphatic glands to the thoracic duct.

Mr. Cruickshanks has remarked a deep and a superficial set of lacteals on the intestines; but for this division there seems no necessity. Deep in the coats the lacteals seem to accompany the blood vessels; but when they get more superficial, they take a course longitudinally on the canal, and after running a little way, they take a sudden turn towards the mesentery.

As the greater frequency of the valvulæ conniventes in the jejunum, greatly increases the extent of the inner surface of that gut, and consequently gives a greater extent of origin to the lacteals; and, as here, the chyle must be in the greater quantity, so the lacteals of this portion of the gut, are larger and more numerous than in any other part of the canal.

The lacteals do not attach themselves to the vessels

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* Vasa chylifera.

of the mesentery, but take a more superficial course. Before they enter the mesenteric glands, they have been called lacteals of the first order; when they emerge from the first into the second glands, secondary lacteals, or glands of the second order.

The absorbents of the stomach form three divisions: one set accompanies the coronary artery and vein, and enters the glands on the lesser curvature of the stomach and the omentum minus. Those of the second set accompany the left gastro-epiploic artery, and are joined by the lymphatics of the omentum. The third pass down upon the upper part of the duodenum, following the arteria gastro-epiploica dextra: these descend to pass into the same class of glands, which receive the lymphatics of the liver. The lymphatics of the stomach are joined in their course by the lymphatics of the right side of the omentum.

The lacteals on the mesentery pass from one gland to another, till they form one or two large trunks only. These accompany the trunk of the superior mesenteric artery, and run down on the right side of the aorta, and join the thoracic duct. The absorbents, from the rectum and colon of the left side, pass into their proper glands, or sometimes into the lumbar glands, and join the thoracic duct separately; those from the right side of the colon join or mingle with the lacteals in the root of the mesentery.

OF THE REMAINING ABSORBENTS OF THE SOLID VISCERA.

Where the lymphatics of the lower extremity descend over the brim of the pelvis, they are joined by the absorbents of the bladder, vesiculæ seminales, and other parts in the pelvis:—small glands belonging to this set, are attached to the internal iliac vessels. In the female, the lower set of lymphatics, from the

womb and vagina, also come by this route to join those of the lower extremity, or run mingling with them. Another set of lymphatics of the womb pass up with the spermatic vessels.

The lymphatics of the TESTICLE are very numerous. They come in distinct sets from the body of the testicle, from the epidydimis, and from the tunica vaginalis: then reaching the cord, from six or ten trunks, and run up direct to the abdominal ring; passing the ring, they turn outward, and then pass over the psoas muscle and into the lumbar glands.

The lymphatics of the KIDNEY are in two sets, superficial and deep-seated; but the former are seldom to be observed. Sometimes disease makes them distinct. The internal lymphatics are demonstrated by blowing into the veins, or tying a ligature and kneading the substance of the kidney with the fingers; when they rise, they are seen attached to the emulgent vessels, and go to join the lumbar glands, or terminate in large lymphatics near the aorta.

It is needless to repeat that the absorbents of the spleen are deep and superficial,—for this arrangement is general in the solid viscera. Emerging from the spleen, the lymphatics pass along the splenic vessels, and enter into glands attached to the splenic artery in its whole course. In this course they receive the absorbents from the pancreas, and near the head of the pancreas they are joined with those of the liver, and with them enter into the thoracic duct.

The lymphatics of the liver are the most easily detected, and they may be injected to greater minuteness, than any other lymphatics of the body. Although they have many valves, yet they do not seem to close the vessels entirely, nor interrupt the mercury from passing from trunk to branch. The superficial lymphatics, which are so numerous that we may sometimes see the mercury in them covering completely and ob-

scuring a considerable part of the liver, have free communication with the internal set of vessels, which are also numerous and large. The principal route of the lymphatics of the upper surface of the liver, is by the broad ligament: these perforating the diaphragm, join the trunk, which we have noticed under the sternum, and in the anterior mediastinum. It would appear, however, that these lymphatics of the broad or suspensory ligament, are by no means constant and uniform in their course: for sometimes they run down towards the lateral ligament, and perforate it there; sometimes they pass down into the thoracic duct while still in the belly. While other lymphatics of great size run off from the convex surface of the liver upon the lateral ligaments, and pierce the diaphragm there. The lymphatics on the lower or concave surface of the liver are more irregular than those of the convex side. They unite with the deep lymphatics coming out of the porta along with the vena portæ, enter into the glands, which are seated on the trunk of that vessel, and join the thoracic duct near the root of the superior mesenteric artery.

The lymphatics of the LUNGS are nearly as numerous as those of the liver; but, indeed, it is more in relation to the facility of injecting and demonstrating the lymphatics, than to their comparative number, that we speak of them in this manner. For example, if the lymphatics of the other viscera could be injected to as great minuteness as those of the liver, we should cease to consider that viscus as more abundantly supplied than other parts. The superficial lymphatics of the lungs form areolæ, and cover the surface almost completely. They take a course to the root of the lungs, where they are joined by the deep-seated vessels, and together pass into the bronchial glands, and here the lymphatics of both sides freely communicate.

The glands of the lungs are constantly found both
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before and behind the bifurcation of the trachea; often these glands are of a very dark color, nay, their substance is often found resolved, as it were, into a sac of ink-like fluid. Upon the arch of the aorta and the root of the great branches are the CARDIAC GLANDS, which receive the lymphatics from the heart. The absorbents from the heart are small, but very numerous, and their larger branches attach themselves to the coronary vessels; they then pass to the cardiac glands and unite with the lymphatics which come from the lungs, and so join the thoracic duct.

DIRECTIONS FOR MAKING LYM-PHATIC PREPARATIONS.

GENERAL OBSERVATIONS.

1. The part should always be injected in a proper tray, that the mercury with which the lymphatics are to be filled, may be easily collected.

2. A lancet, with a curved needle ready threaded, should be always at hand.

3. A bottle, whose neck is not so wide as to permit the quicksilver tube going to the bottom, when placed in it.

4. When injecting, if any circumstance renders it necessary for the injector to put aside the tube with the mercury, it should be placed in the bottle, the mercury remaining in it, to be convenient, and to prevent delay.

5. Injecting with mercury is always tedious, and frequently unsuccessful. The parts exposed must be kept moist, by sprinkling them with cold water.

A SUPERIOR EXTREMITY.

To inject the lymphatics of an arm, choose one from a dropsical subject, without fat; make an incision into the skin around the wrist, and seek diligently, with a magnifying glass, for an absorbent, into which the pipe is to be put, when the quicksilver will immediately run. The shoulder should now be placed considerably lower than the hand; and, when the mercury runs out at the divided vessels in the axilla, tie them up, and also the lymphatic, into which the pipe was introduced. Then seek for another absorbent. When the mercury ceases to run in a lymphatic, tie the vessel, and seek for another.

Dissection. Begin at the lymphatics where the mercury entered, and trace them; removing every thing that obstructs their view, but preserve the glands.

AN INFERIOR EXTREMITY.

The limb for this purpose should also be taken from a dropsical person, and the same method adopted as with the superior extremity, seeking as near to the toes as possible for the lymphatics.

A PAROTID GLAND.

Cut down upon the masseter muscle, and seek for the Stenonian duct, which is the excretory duct of the parotid. Tie the quicksilver pipe in it, then fix the tube, and pour into it the quicksilver; and, when it ceases to run, remove the tube and pipe, and tie the duct. Be particularly careful, in dissecting away the gland, not to cut it.

Preservation. Dry it on a waxed board, and preserve it on a blue paper and pasteboard, in spirit of turpentine.

LIVER.

The lymphatics running on the peritoneal coat of the liver, and over the gall bladder, make a beautiful preparation. The liver should be well soaked for several days, and the pipe put into the lymphatics of the suspensory and coronary ligaments, and the mercury forced along them, breaking down the valves with the nail, by pressing on the mercury. Secure the vessels at the portæ of the liver, when the mercury gets there, and tie the lymphatics when filled. Should the anatomist's attempt to force the quicksilver beyond the valves be unsuccessful, he must fix upon the most minute obvious branch, and let it run its proper course.

Preservation. Throw some coarse injection into the cavæ hepaticæ and vena portæ, without heating the liver thoroughly; inflate the gall bladder, and dry the whole. Varnish it, and preserve it in the best manner under a glass bell, or preserve the injected part in proof spirit, without any wax injection.

LUNGS.

The superficial lymphatics of the lungs are to be filled from the part most remote from the root of the lungs.

Preservation. Cut away the part on which the lymphatics are filled. Dry it on a waxed board, varnish it, and preserve it in a bottle, on a green or blue piece of paper; or preserve it in proof spirit, without drying it.

HAND.

Select the hand of an aged female (separated from the arm by a transverse section, three inches above the wrist,) that has died of a lingering disease. Soak

out the blood in warm water; fix the pipe in the rad-
ial artery, then add the tube, and pour into it the
mercury. As the mercury appears in the other arte-
ries and veins, take them up and secure them with
ligatures. Should the mercury still escape from small
branches, put a cord round the arm, and with a piece
of wood tighten it, by twisting the cord, taking care
not to prevent the mercury passing into the hand.
Then suspend the hand in a glass filled with water,
and suspend also the tube and quicksilver, for a day
or two, that the mercury may get into the small ves-
sels. When injected, remove the pipe, and tie, by a
strong string, the fore-arm; put the hand into water,
until putrefaction separates the cuticle.

Preservation. Dry it carefully, and varnish it;
then fix the fore-arm in a pedestal of plaister of Paris,
and keep the preparation under a glass bell.

LACTEALS.

Remove the mesentery and intestines, if the former
be perfectly free from fat, and let them remain seve-
ral days in water, which should be frequently chang-
ed. Search for an absorbent, on the intestine, into
which introduce the quicksilver, which will run on
to the glands in the mesentery, where it will stop.
When the lacteals are filled, the preparation will be
improved by injecting the mesenteric arteries and
veins with red and yellow matter.

Preservation. Spread the mesentery on a waxed
board, inflate a portion of the intestine, remove all
that is useless; dry and varnish, and preserve it in a
glass frame.

FINIS.